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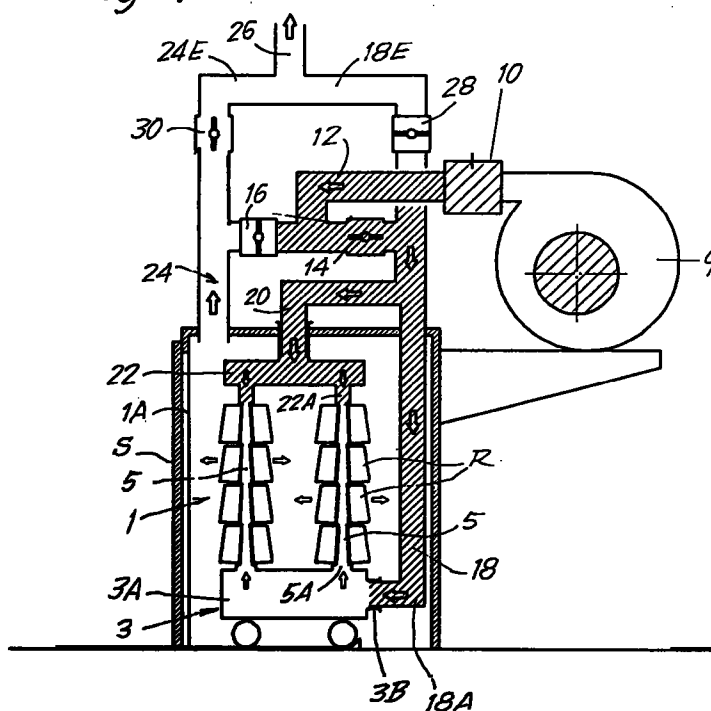
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(54) Drier for stacked yarn packages in dyeing installations and the like

(57) The packages, stacked on multiple permeable spindles, are dried by a generally radial flow of air through the yarn wound on the packages, and also by successive cycles of alternating flow; connection means

are provided for moving the air to both the opposite ends (5A, 5B) of the spindles, in order to bring about the simultaneous ingress or egress of the air at both ends.

Fig. 4



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Description

For dyeing installations and the like, driers are known in which a plurality of packages are stacked coaxially via their centres on a permeable spindle; they are generally in a multi-spindle arrangement of handling trolleys which are introduced, with the packages to be dried, into the drying chamber; in this chamber there are means for producing a generally radial flow of air through the yarn material wound on the packages, and through the spindle, which is permeable. It is possible to provide successive cycles of alternating flow passing through the packages from the interior towards the exterior and from the exterior towards the interior. Drying occurs by introducing hot air under pressure generated by a fan situated outside the cell; the air, properly filtered and heated by a heat exchanger, is introduced into the packages in such a way as to cause it to pass from the interior towards the exterior and vice versa by diverting the flow of air using suitable diverting means. The air is fed into or sucked out of one of the ends of the or of each spindle. With this arrangement a difference is noted in the drying - or at least in the drying times - of the packages, depending on how far the latter are located, in the column of stacked packages, from the end at which the air is being introduced or extracted, due to the fall in pressure that occurs along the length of the spindle, the cross-section of which is not great; this can lead to differences between the characteristics of the yarns of the various packages. Figs. 1 and 2 show the air being introduced into a spindle from above (Fig. 1) and from below (Fig. 2) and the corresponding variation in the amount of air through the packages according to how far they are from the inlet end. The same applies during extraction. The different sizes of arrows fA and fB indicate the different amounts of airflow through the packages.

The invention avoids or substantially reduces the above-indicated problem by the provision of connection means for moving the air to the two opposite ends of the spindle or spindles in order to bring about either the ingress or the egress of the air at both said ends, especially simultaneously. This gives the advantage of faster and more uniform drying of all the packages in a stack.

The invention will be understood more clearly on examining the description and accompanying drawing, which latter shows a practical, illustrative, non-restricting example of the invention. In the drawing:

Figs. 1 and 2 show conventional systems of operation as already discussed;

Figs. 3 to 5 show in outline a drier according to the invention during loading or unloading and during drying with air being blown centrifugally and centripetally through the packages; and

Fig. 6 shows the system of operation of said drier, to be compared with the systems of Figs. 1 and 2.

In Figs. 3 to 5, 1 is the drying chamber accessible through an opening 1A through which a trolley 3 enters

and exits. The trolley 3 comprises a plurality of tubular spindles 5 which are permeable; mounted on the spindles are the packages R of yarns to be dried, with their centres. Each trolley comprises a manifold 3A with a connection 3B at the front for connecting it up to the forced-airflow installation. The spindles 5 are in communication at the foot 5A with the manifold 3A and at the top are open to form further connections 5B. The chamber 1 can be closed by a door S.

Connected to the drying chamber 1 is a forced-air-flow unit that comprises a fan 9 combined with a heat exchanger 10 for heating the air which is then blown into the drying chamber 1. The delivery duct 12 of the fan divides into two paths controlled respectively by a valve 14 and a valve 16. Valve 14 gives control over two blowing ducts, the lower duct 18 and the upper duct 20; the lower duct 18 ends with a connection 18A able to link up with the connection 3B on the trolley 3. The upper duct 20 leads to a vertically movable unit comprising a manifold 22 having connections 22A corresponding in position to the positions of the top connection ends 5B of the spindles 5, when the trolley 3 is introduced and positioned inside the drying chamber 1. The diverting valve 16 controls a duct connecting the unit 9, 10, 12 to the drying chamber 1. The two circuits controlled by the valves 14, 16 also have, downstream of the valves, a respective branch 18E and 24E for discharge 26 to the exterior; said branches 18E and 24E are controlled by respective valves 28 and 30.

When a trolley 3 has been introduced into the drying chamber and placed in position for the drying operations, its connection 3B is fitted to the connection 18A, while the manifold unit 22 is lowered to fit its connections 22A to the open top ends 5B of the spindles 5.

Thus prepared, the drying system, connected up to the fan 9 and to the heat exchanger 10 for heating the air, can be turned on. Two different operating modes are possible successively and cyclically as shown in Figs. 4 and 5. Fig. 4 shows a mode in which there is flow from the inside of the spindles 5 through the coils of yarn of the packages R centrifugally towards the drying chamber 1; see also Fig. 6. Valves 14 and 30 are open and valves 16 and 28 are closed. The hot air under pressure is introduced into the two ducts 18 and 20 and thence into the two manifolds 3A and 22. The air then passes into each spindle 5 simultaneously from both the lower 5A and upper 5B ends. This produces a more or less uniform action of the air on all the packages R mounted on the spindles 5, precisely because of the dual supply from both ends of the spindles and hence the practically uniform pressure of air at the various levels of each spindle; as a result there is uniform pressure on packages in every position along the spindles; the arrows fA in Fig. 6 illustrate this mode, which is a decided improvement on that of Fig. 1 or Fig. 2. Exhausted air is discharged through the duct 24, 24E and the discharge 26.

Switching the path of the air by opening valve 16 and valve 28 while closing valve 14 and valve 30 results in the flow of air shown in Fig. 5, the air being introduced

into the drying chamber 1 while exhausted air can be carried away through ends 5A, 5B of the spindles 5 and the ducts 18, 20 and 18E, in other words with a centripetal path of the hot air from the chamber through the packages and finally into the spindles 5 and manifolds 3A and 22, with more or less uniform pressure at every level of the spindles 5. This mode is equal to that shown in Fig. 6 with the arrows reversed.

When drying has been finished, the manifold unit 22 is raised again and, after the door S has been withdrawn, the trolley 3 with the dried packages is then taken out through the opening 1A. Another trolley is then introduced in order for the packages mounted on it to undergo the drying treatment.

It will be clear that this arrangement provides more or less uniform drying and also faster drying owing to the improved flow brought about by feeding the air in and exhausting it through both ends 5A, 5B of each of the spindles 5.

More or less uniform drying is also achieved by adopting alternate introduction through the connections 3A and 22A and by alternate extraction through said connections, but with a slower action.

It will be understood that the drawing shows only an illustrative embodiment purely by way of a practical demonstration of the invention, it being possible for the invention to vary as regards shapes and arrangements without thereby departing from the scope of the concept underlying the invention. The presence of any reference numerals in the accompanying claims is purely in order to facilitate the reading of the claims with reference to the description and to the drawing, and does not limit the scope of protection represented by the claims.

Claims

1. Drier for yarn packages in dyeing installations and the like, in which a plurality of packages are stacked coaxially via their centres on a permeable spindle, generally in a multi-spindle arrangement, means being provided for producing a generally radial flow of air through the yarn wound on the packages, and also with successive cycles of alternating flow, that is centripetal and centrifugal flow, the drier being characterized in that it comprises connection means (3A, 22) for moving the air to both the opposite ends (5A, 5B) of the or of each spindle (5), in order to bring about either the ingress or the egress of the air at both said ends.
2. Drier according to Claim 1, characterized in that the ingress or the egress of the air is produced simultaneously at both said ends.
3. Drier according to Claim 1 or 2, comprising a drying chamber (1) provided with a forced-flow unit (9, 10, 26) which also heats up the air in the chamber and discharges the exhausted air, in a reversible circuit, and package-supporting trolleys (3) with one or

more permeable spindles (5), the drier being characterized in that said spindle (5) or each of said spindles (5) is connected during operation to a first lower manifold (3A) that can be connected up to the forced-flow system, and to a second upper manifold (22) that can be moved towards and away from the package-supporting spindles (5) of the trolley (3) extending in the working position inside the box, said second auxiliary manifold also being connected to the forced-flow and switching system.

4. Drier for drying stacked yarn packages in dyeing installations and the like; the whole being as described above and illustrated by way of example in the accompanying drawing.

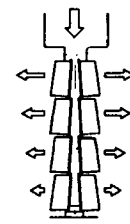
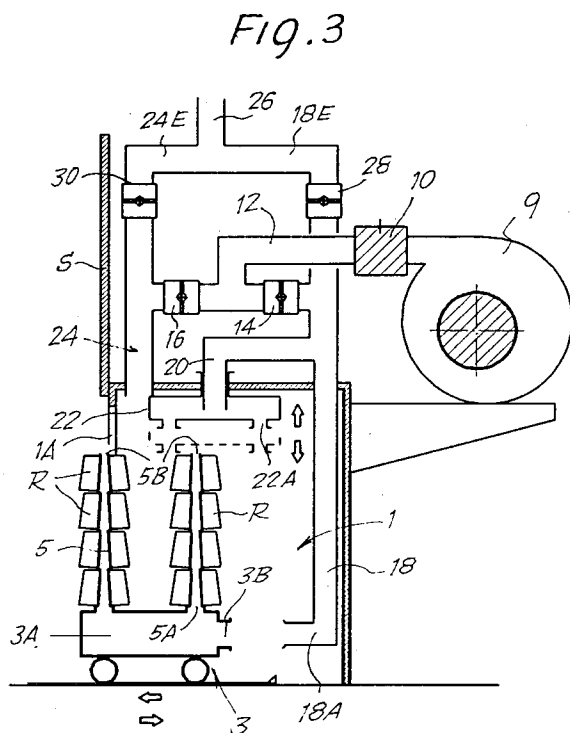


Fig. 1

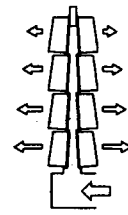


Fig. 2

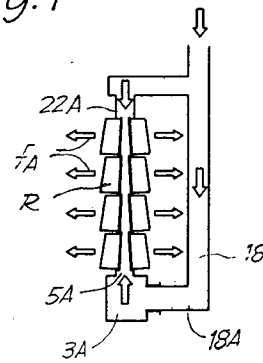
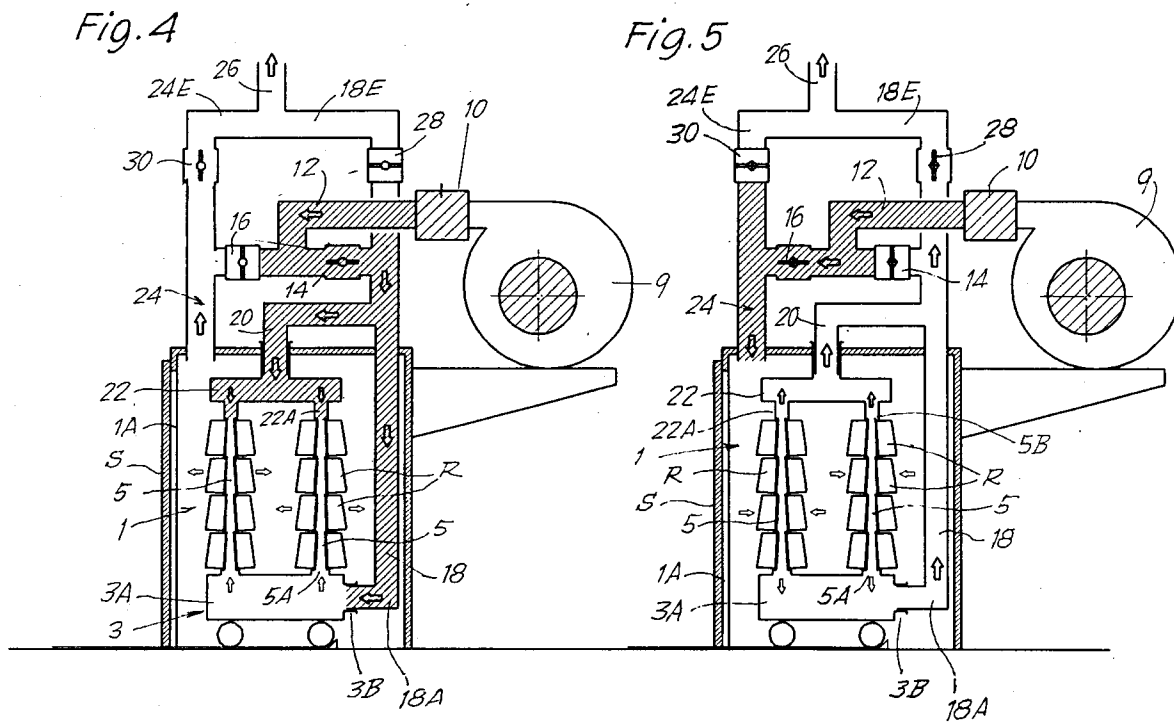


Fig. 6





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EUROPEAN SEARCH REPORT

Application Number
EP 94 83 0546

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.6)
Y	US-A-1 878 776 (L. HOLT) * the whole document *	1,2,4	D06B5/16 F26B21/00
Y	GB-A-655 403 (H.W. WAGHORN) * page 3, line 30 - line 65; figure 3 *	1,2,4	
A	GB-A-586 600 (F.B. DEHN) * figures *	3	
A	DE-A-16 35 211 (JAGRI GMBH MASCHINEN- UND APPARATEBAU) * page 6, line 3 - line 9; figure 1 *	1,2	
A	DE-A-20 57 344 (FA. B. THIES) * the whole document *	1,2	
A	DE-A-25 55 974 (JAGRI MASCHINEN- UND APPARATEBAU GMBH) * page 7 - page 8 *	1,2	
A	WO-A-89 02002 (G. GEBALD; M. LANGEN)		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	FR-A-2 359 234 (ILAI S.R.L.)		D06B F26B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 May 1995	Examiner D Hulster, E
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