PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :		(11) International Publication Number:	WO 93/14256
D06B 5/24	A1	(43) International Publication Date:	22 July 1993 (22.07.93)

(21) International Application Number: PCT/GB93/00031

(22) International Filing Date: 8 January 1993 (08.01.93)

(30) Priority data:
9200810.1 15 January 1992 (15.01.92) GB

(71) Applicant *(for all designated States except US)*: CV APPAREL LIMITED [GB/GB]; Common Road, Huthwaite, Sutton in Ashfield, Nottinghamshire NG17 6AB (GB).

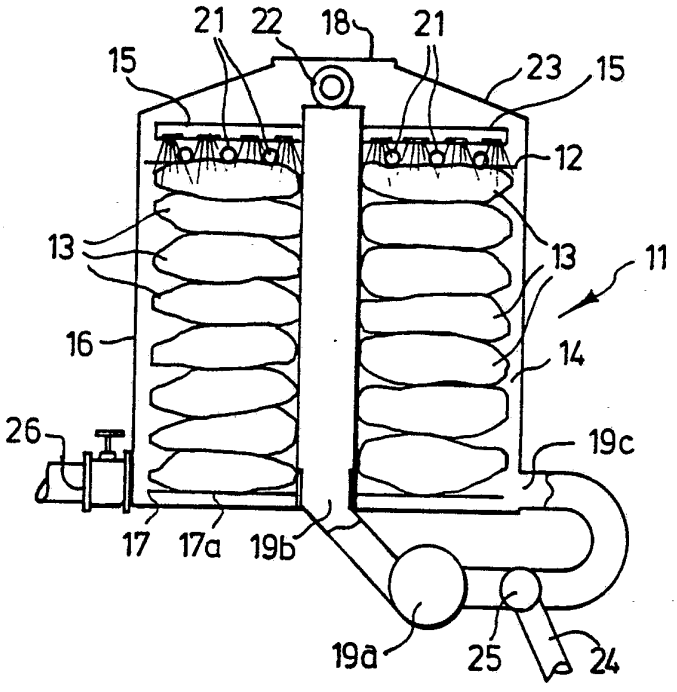
(72) Inventor; and
(75) Inventor/Applicant *(for US only)* : SMITH, George, Francis [GB/GB]; 19 Riversdale, Ambergate, Derbyshire DE56 2EU (GB).

(74) Agents: McNEIGHT, David, Leslie et al.; McNeight & Lawrence, Regent House, Heaton Lane, Stockport, Cheshire SK4 1BS (GB).

(81) Designated States: AT, AU, BB, BG, BR, CA, CH, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, PL, RO, RU, SD, SE, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: DYEING TEXTILE ARTICLES



(57) Abstract

Method and apparatus for dyeing textile articles in which the articles are confined in bulk but in orderly fashion in a dyebath up to a level therein, the dyebath is loaded with dye liquor to cover the articles and the liquor is circulated through forceful sprays directed towards the articles from above said level.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**FR**	France	**MR**	Mauritania
AU	Australia	**GA**	Gabon	**MW**	Malawi
BB	Barbados	**GB**	United Kingdom	**NL**	Netherlands
BE	Belgium	**GN**	Guinea	**NO**	Norway
BF	Burkina Faso	**GR**	Greece	**NZ**	New Zealand
BG	Bulgaria	**HU**	Hungary	**PL**	Poland
BJ	Benin	**IE**	Ireland	**PT**	Portugal
BR	Brazil	**IT**	Italy	**RO**	Romania
CA	Canada	**JP**	Japan	**RU**	Russian Federation
CF	Central African Republic	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CG	Congo			**SE**	Sweden
CH	Switzerland	**KR**	Republic of Korea	**SK**	Slovak Republic
CI	Côte d'Ivoire	**KZ**	Kazakhstan	**SN**	Senegal
CM	Cameroon	**LI**	Liechtenstein	**SU**	Soviet Union
CS	Czechoslovakia	**LK**	Sri Lanka	**TD**	Chad
CZ	Czech Republic	**LU**	Luxembourg	**TG**	Togo
DE	Germany	**MC**	Monaco	**UA**	Ukraine
DK	Denmark	**MG**	Madagascar	**US**	United States of America
ES	Spain	**ML**	Mali	**VN**	Viet Nam
FI	Finland	**MN**	Mongolia		

DYEING TEXTILE ARTICLES

This invention relates to dyeing textile articles and in particular, though not necessarily exclusively, to the dyeing of hosiery such as ladies' stockings and tights.

There are many ways of dyeing textile articles and many different types of dyeing machinery. The problem is always to find an economical method which can be carried out on machinery of low capital cost and maintenance requirements which is, however, effective to produce uniform dyeing both from article to article and as between different parts of the same article.

The invention provides a method which is particularly satisfactory, at least for the dyeing of ladies hosiery, in all of these regards and machinery for carrying out the method.

The invention comprises a method for dyeing textile articles comprising confining said articles in bulk but in orderly fashion in a dyebath up to a level therein, loading the dyebath with dye liquor to cover the articles and circulating said liquor through forceful sprays directed towards the articles from above said level.

Pretreatment of the articles, including scouring and the application of dyeing assistants such as levellers and retarders, may be carried out in the dyebath with liquid circulated through said sprays.

The articles may be packed in readily penetrable bags and a plurality of such bags packed in the dye bath. Hosiery articles such as stockings and tights may advantageously be packed flat in the bags rather than just being bundled in; the orderly packing avoids tight tangles resistive to dye liquor penetration, and facilitates unpacking.

The invention also comprises apparatus for dyeing textile articles comprising a dyebath loadable up to a level with articles to be dyed and circulating means for circulating dye liquor through the dyebath including forceful sprays located above said level and directed downwardly at articles confined in the dyebath.

The dyebath may comprise an open topped container and a removable insert, the insert comprising a carrier for carrying the articles to be dyed in bulk but in orderly fashion and having a column from which extends, above said level, an array of perforated tubes constituting said sprays and connected via said column to forced circulation means for the container.

The container may have a removable lid to prevent spashing out of liquor during the dyeing process, and the lid may be carried on the removable carrier.

The container may be rectangular in plan, the column extending along the container, desirably in a central position so that the array of sprays extends either side of the column.

The carrier may comprise a framework adapted to confine a charge of articles to be dyed so that the articles can be loaded into the framework with the carrier removed from the container and the loaded carrier then lowered into the open topped container. The provision of a second carrier allows one to be in use for dyeing while the second is being charged for instant loading into the container as soon as the dyeing operation on the first is completed.

Embodiments of apparatus and methods for dyeing textile articles will now be described with reference to the accompanying drawings, in which :-

Figure 1 is a cross-section of one embodiment of apparatus;

and Figure 2 is a plan view of the apparatus of Figure 1.

The apparatus illustrated in Figures 1 and 2 comprises a dyebath 11 loadable up to a level 12 with articles 13 to be dyed, and circulating means for circulating dye liquor 14 through the dyebath 11 including forceful sprays 15 located above said level 12 and directed downwardly at articles 13 confined in the dyebath 11.

The dyebath 11 comprises an open topped container 16 and a removable insert 17, the insert comprising a carrier for carrying the articles 13 in bulk but in orderly fashion, and having a column 18 from which extends, above said level 12, an array of perforated tubes constituting said sprays 15 and connected via said column 18 to forced circulation means 19 for the container. The circulation means 19 comprise a powerful pump 19a delivering to an inlet 19b to the container 16 beneath the column 18 and receiving liquor 14 from the container 19 from a bottom outlet 19c thereof. There may be several inlets 19b and outlets 19c spaced apart in the container 19 to ensure even circulation throughout the dyebath 11.

The container 19 is rectangular in plan and the column 18 extends midway thereof from end to end.

The carrier 17 is adapted to confine a charge of articles 13 to be dyed so that the articles can be loaded into the framework on the base 17a thereof with the carrier 17 removed from the container 19. The articles are constrained in the carrier by a framework of rods 21 stretching along the length of the carrier, parallel to the column 18. The carrier 17 has a hoisting ring 22 the hoist attachment also carrying a lid 23 to cover the arrangement and prevent splashing out during operation.

In use, a second carrier 17 can be loaded with the next charge of articles 13 to be dyed while a first carrier is in the dyebath.

The loaded carrier 17 may be put into the empty container 19 at the start of the dyeing process and a scouring operation performed by introducing a scouring liquid into the dyebath 11 and circulating the liquid so that it is sprayed on to the articles 13. The scouring liquid is allowed to build up until the articles are covered and scouring continued for as long as deemed necessary. The scouring liquid can then be drained off through a valved drain 24 and any other desired pretreatment applied to the articles 13 by introducing liquid containing chemicals as may be desired as for the scouring liquid. This liquid is then drained off when appropriate and the dye liquor admitted in the same say.

The pump power and the spray arrangement are such as will effect rapid penetration of dye liquor as a result of the kinetic energy of the dye liquor emerging from the sprays 15 right down to the lowermost articles in the charge, and so that liquor will still circulate through these lowermost articles at least partly as a result of its initial kinetic energy from the spray.

The articles 13 are packed in batches in loosely knitted bags. If the articles are ladies' hosiery, they can be arranged flat and generally aligned in the bags which are tied so as to hold their contents firmly but not tightly, so that liquor can readily penetrate but that even under the force of the jets, the contents are held against substantial movements, so that when the process is over they can be readily unpacked without the need for unravelling.

A dyebath as illustrated may have a volume of several cubic metres and hold a charge of many thousand hosiery articles. It is found that using the forced spray circulation all the articles in a charge are dyed uniformly and without tangling.

Other embodiments of apparatus may of course be contemplated - the apparatus may for example be circular in plan with an axial column and jets and framework members radiating therefrom.

It may be the case that the effectiveness of the method and the apparatus as described is due at least in part to the turbulence created at all levels by the effect of the jets. It is not necessary to have the jets above the level of liquid in the dyebath, but this does permit of visual inspection to check that the jets are all functioning properly.

CLAIMS

1. A method for dyeing textile articles comprising confining said articles in bulk but in orderly fashion in a dyebath up to a level therein, loading the dyebath with dye liquor to cover the articles and circulating said liquid through forceful sprays directed towards the articles from above said level.

2. A method according to claim 1, in which the articles are pre-treated, as by scouring and/or the application of dyeing assistants such as levellers and retarders, in the dyebath with liquid circulated through said sprays.

3. A method according to claim 1 or claim 2, in which the articles are packed in readily penetrable bays and a plurality of such bags packed in the dyebath.

4. A method according to claim 3, in which the articles are hosiery articles such as stockings and tights and are packed flat in the bags.

5. Apparatus for dyeing textile articles comprising a dyebath loadable up to a level with articles to be dyed and circulating means for circulating dye liquor through the dyebath including forceful sprays located

above said level and directed downwardly at articles confined in the dyebath.

6. Apparatus according to claim 5, comprising an open topped container and a removable insert, the insert comprising a carrier for carrying the articles to be dyed in bulk but orderly fashion and having a column from which extends, above said level, an array of perforated tubes constituting said sprays and connected via said column to forced circulation means for the container.

7. Apparatus according to claim 6, comprising a removable lid for the container.

8. Apparatus according to claim 7, in which the lid is carried on the removable carrier.

9. Apparatus according to any one of claims 6 to 8, in which the container is rectangular in plan.

10. Apparatus according to claim 9, in which the column extends along the container.

11. Apparatus according to claim 10, in which the column extends along the container in a central position so that the array of sprays extends either side of the column.

12. Apparatus according to any one of claims 6 to 11, in which the carrier comprises a framework adapted to confine a charge of articles to be dyed so that the articles can be loaded into the framework with the carrier removed from the container and the loaded carrier then lowered into the open topped container.

13. Apparatus according to claim 12, comprising a second carrier which can be charged whilst the first is in use for dyeing.

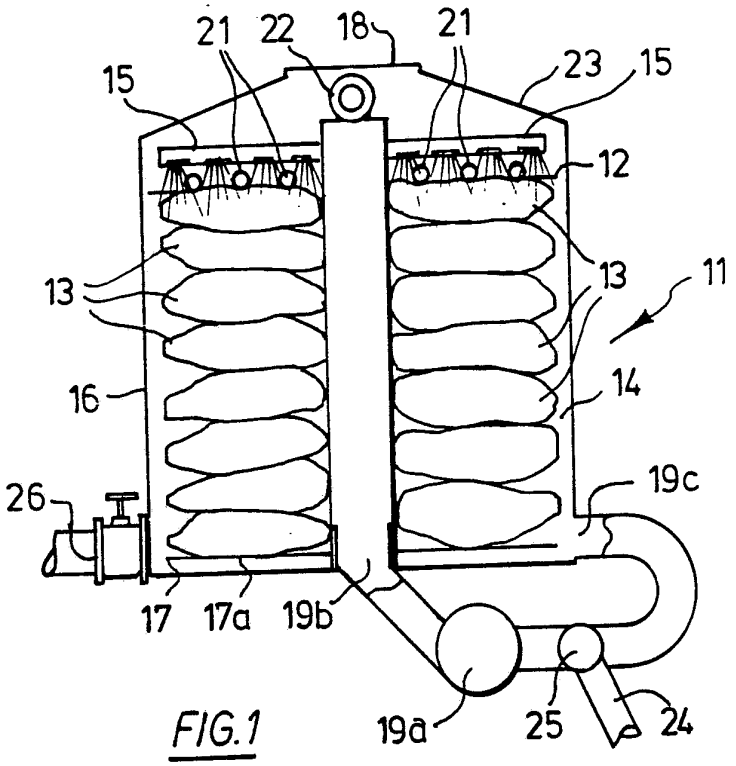

21
22
18
21
23
15
15
12
13
13
11
16
14
19c
26
17
17a
19b
19a
25
24

FIG.1

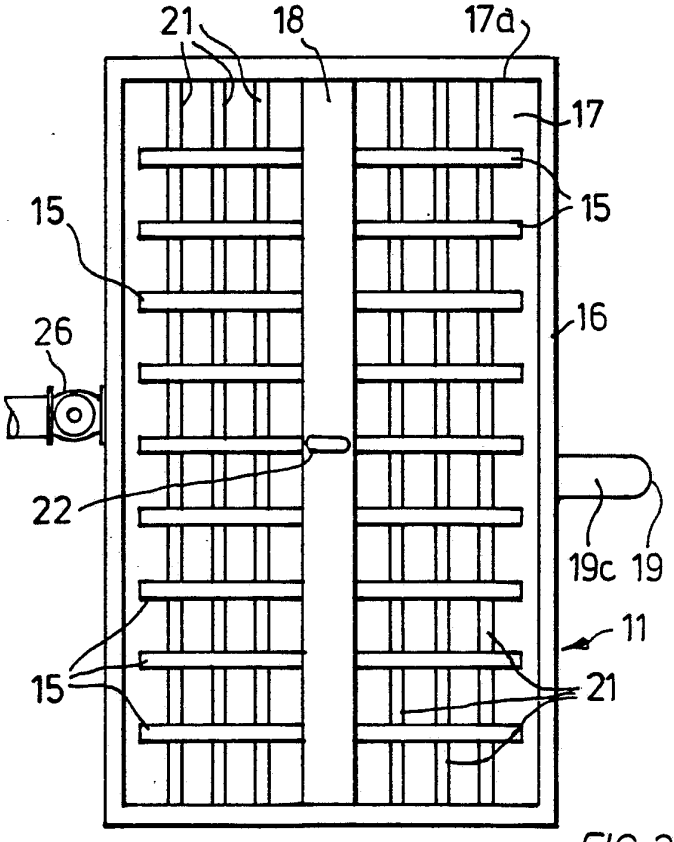

21
18
17a
17
15
15
26
16
22
19c
19
11
15
21

FIG.2

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 93/00031

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 D06B5/24

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	D06B

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
X	FR,A,2 388 071 (TRATTA & TAGLIAFERRI) 17 November 1978 see the whole document	1-5,7
X	EP,A,0 345 617 (CUBOTEX) 13 December 1989 see the whole document	1,5,6,9, 12
A	FR,A,2 290 520 (GIBERSTEIN) 4 June 1976	
A	DE,A,1 635 086 (THIES) 25 March 1971	
A	US,A,2 985 502 (BELLFOUR) 23 May 1961	

° Special categories of cited documents : [10]

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

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
28 APRIL 1993	24. 05. 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	PETIT J-P

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 9300031
SA 69435

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 28/04/93

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A-2388071	17-11-78	CA-A- 1091944	23-12-80
		DE-A- 2815994	26-10-78
		GB-A- 1603316	25-11-81
		JP-C- 1377157	08-05-87
		JP-A- 53130376	14-11-78
		JP-B- 61044985	06-10-86
		US-A- 4231236	04-11-80
EP-A-0345617	13-12-89	US-A- 4961327	09-10-90
FR-A-2290520	04-06-76	None	
DE-A-1635086	25-03-71	None	
US-A-2985502		None	