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54 **Device to dry textile materials.**

57 Device (10) to dry textile materials such as yarns (14), woven fabrics, etc. which cooperates advantageously with apparatuses that treat such materials continuously such as mercerising machines, stretchers, etc. and with means that take up the textile materials thus treated, the device (10) consisting of:

- a heater body (11) employing a forced (22) circulation (21) of air,
- assemblies of upper (12) and lower (13) rolls which pass the textile materials through the heater body (11),
- means (27-28) that deliver air from the exterior (25) towards the inside (29) of the heater body (11), and means (24) that heat the air thus delivered, and
- means (32-33) that remove the air from the inside of the heater body (11) towards the exterior (31),

the quantity of air delivered (29) into the heater body (11) being coordinated with the quantity of air discharged (31) from the heater body (11).

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This invention concerns a device to dry textile materials; to be more exact, the invention concerns a drier device suitable to cooperate with apparatuses that treat textile materials continuously such as mercerising machines, stenters and other like apparatuses.

By textile materials are meant yarns or pluralities of yarns, woven fabrics, fitted textile carpets or other like materials.

The state of the art covers a plurality of drier devices used in the textile field and elsewhere on materials which are unwound continuously; these known devices employ a variety of drier means in cooperation with an enormous range of heater means.

So far as the present applicant is aware, however, embodiments such as those disclosed in this invention are not known in the state of the art.

The present applicant has the purpose of providing an efficient, simple drier device able to meet the most stringent requirements of the market.

The invention is set forth in the main claim, while the dependent claims describe various features of the invention.

The drier device according to the invention consists of a drier body within which the textile material, for instance a bundle of parallel yarns, to which we shall refer in the description that follows, is made to run continuously.

But it should be clearly understood that other materials such as woven fabrics, fitted textile carpets and analogous materials can also be processed.

The material leaving the drier body is thereafter taken up on means suitable for the purpose.

The bundle of yarns upstream of the drier body is passed through a water removal assembly and is thereafter lapped within the drier body by a draught of hot air produced by forced circulation.

The air is heated advantageously, but not only, by a submerged combustion means.

The system of working and the embodiment of the drier device according to the invention are such as to obtain the continuous drawing of a quantity of air from outside the device, this quantity balancing a substantially equivalent discharge of air from within the device towards the outside.

Means are included to check the relative humidity of the bundle of yarns leaving the device and can control and condition the state of entry and exit of air into and from the drier device.

Means are also comprised to check the temperature of the air within the device and can condition the parameters of the heating of the air.

These and other special features of the invention will be made clearer in the description that follows.

The attached figures, which are given as a non-

restrictive example, show the following:-

Fig.1 gives a diagram of a drier device according to the invention;

Fig.2 is a three-dimensional drawing of a detail of the device of Fig.1.

In Fig.1 a drier device 10 of the invention consists of a heater body 11 which contains an assembly 12 of upper rolls and an assembly 13 of coordinated lower rolls.

A bundle of yarns 14 is passed alternately between the upper rolls 12 and lower rolls 13 within the body 11.

The bundle of yarns 14 reaches the drier device 10 in the direction of the arrow 15 after undergoing a wet treatment, for instance continuous mercerising of the type disclosed in application IT-A-83488 A/89 in the name of the present applicant.

The bundle of yarns 14, before entering the heater body 11 of the drier device 10, passes advantageously through a water removal assembly 16, which consists of a Venturi tube 17 (see Fig.2) cooperating with a first aspirator fan 18 equipped with its own motor 19.

The combined action of the Venturi tube 17 and aspirator fan 18 causes removal of humidity according to the arrow 20 from the bundle of yarns 14, which upon entry into the heater body 11 may possess advantageously a degree of relative humidity of about 70%.

During its series of passes between the upper 12 and lower 13 rolls the bundle of yarns 14 is lapped by a draught of hot air circulating according to the arrow 21 within the heater body 11. This air is circulated by a second fan 22 driven by its own motor 23.

The bundle of yarns 14 leaving the heater body 11 possesses a relative humidity of about 7 to 8%. The yarns 14 thus dried can be taken up thereafter on a suitable take-up means such as a beam or, if they are divided into groups, on a plurality of beams.

The heating of the air circulating within the heater body 11 at a temperature within a range of about 90° to 120° C is achieved by means of a so-called submerged combustion system, which provides for the heater means, in this case a burner 24, to be immersed directly in the air to be heated.

The air to be heated is drawn from the exterior according to the arrow 25, is filtered 26 and then is passed through a pipe 27 by a third fan 28, which is connected advantageously to its own motor 23.

The air which is delivered along the pipe 27 according to the arrow 29 into the heater body 11 may be pre-heated by a suitable means 30 located in the pipe 27 downstream of the filter 26.

The air heated in the pipe 27 is introduced into the heater body 11 in a quantity proportional to a coordinated quantity of air discharged through a

stack 32 according to the arrow 31.

To this end a valve 33 is positioned in the stack 32 so as to regulate the flow of air discharged and is operated by a hygrometer 34 that measures the percentage of relative humidity found in the bundle of yarns 14 leaving the drier device 10.

In this way are obtained an efficient control and sustainment of ideal working conditions of the system of hot air and bundle of yarns 14.

A thermometer 35 to measure the temperature of the hot air circulating within the heater body 11 according to the arrow 21 is also included. This thermometer 35 cooperates suitably with the feed of air 36 and gas 37 to the burner 24.

We have described here a preferred embodiment of the invention but many variants are available to a person skilled in this field without departing thereby from the scope of the invention as claimed. For instance, it can be pointed out that the system to heat the air by submerged combustion can be replaced by other known combustion systems suitable for the purpose.

Claims

1. Device (10) to dry textile materials such as yarns (14), woven fabrics, etc. which cooperates advantageously with apparatuses that treat such materials continuously such as mercerising machines, stenters, etc. and with means that take up the textile materials thus treated, the device (10) being characterized in that it consists of:
 - a heater body (11) employing a forced (22) circulation (21) of air,
 - assemblies of upper (12) and lower (13) rolls which pass the textile materials through the heater body (11),
 - means (27-28) that deliver air from the exterior (25) towards the inside (29) of the heater body (11), and means (24) that heat the air thus delivered, and
 - means (32-33) that remove the air from the inside of the heater body (11) towards the exterior (31),
 the quantity of air delivered (29) into the heater body (11) being coordinated with the quantity of air discharged (31) from the heater body (11).
2. Device (10) as claimed in Claim 1, in which an assembly (16) to remove water from the textile material is included upstream of the heater body (11).
3. Device (10) as claimed in Claim 1 or 2, in which the water removal assembly (16) con-

sists of a Venturi tube (17) connected to aspiration means (18) equipped with their own motor (19).

4. Device (10) as claimed in any claim hereinbefore, in which the means (24) to heat the air are of a submerged combustion type.
5. Device (10) as claimed in any claim hereinbefore, in which means (30) to pre-heat the air are included upstream of the means (24) that heat the air.
6. Device (10) as claimed in any claim hereinbefore, in which the feed (36-37) of air to the air heating means (24) is governed by a thermometer (35) that measures the temperature of the air circulating within the heater body (11).
7. Device (10) as claimed in any claim hereinbefore, in which the means (32-33) that remove the air from the heater body (11) are governed by a hygrometer means (34) that measures the relative humidity of the textile material leaving the heater body (11).

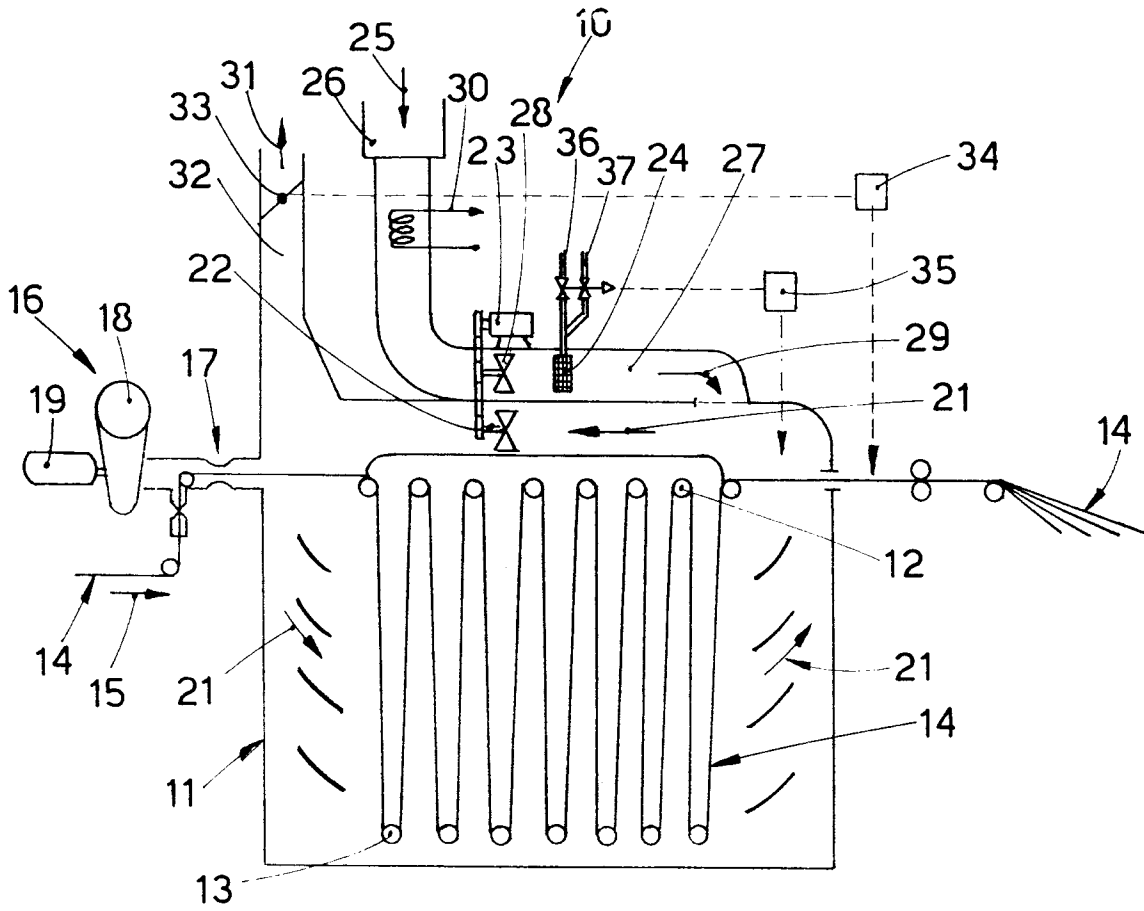


fig. 1

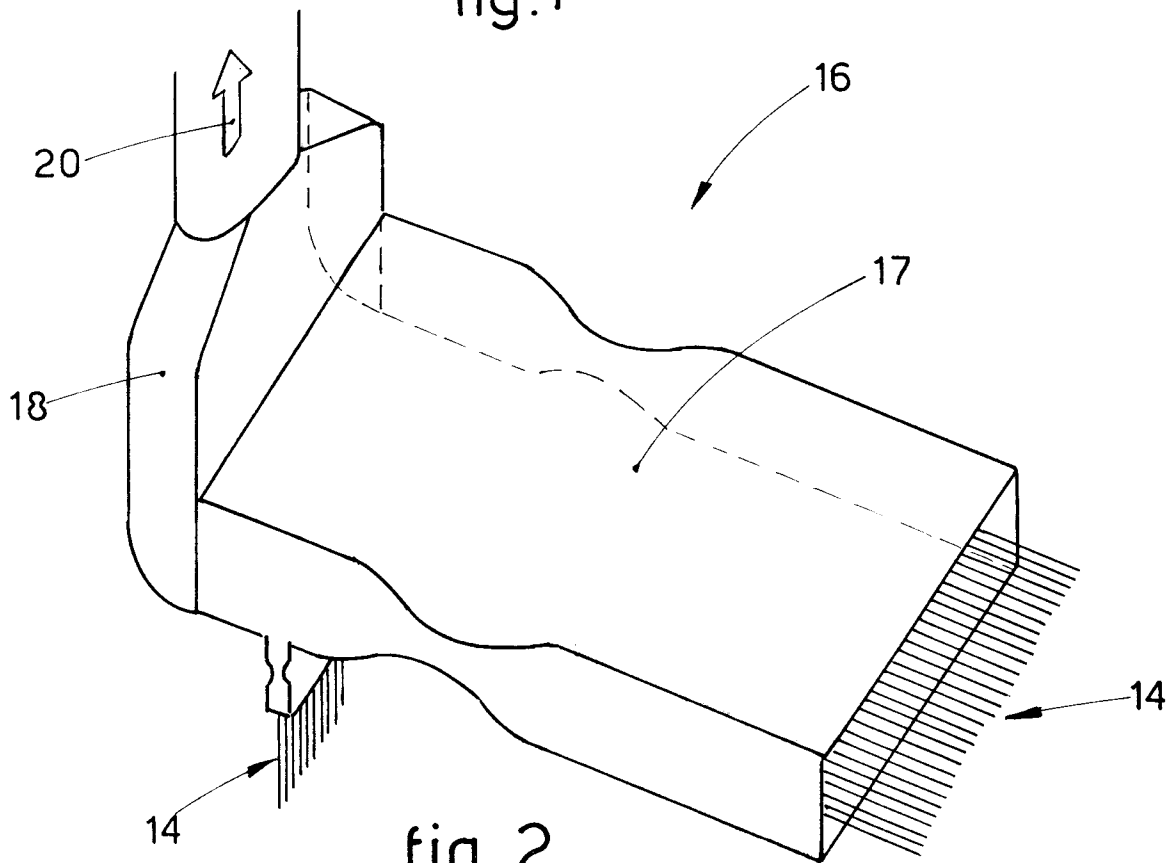


fig. 2



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)
Y	DE-A-1 635 277 (BUTTNER-SCHILDE-HAAS AG) * the whole document * ---	1, 2, 5	F26B13/10 F26B21/02
Y	WO-A-8 302 312 (A. MONFORTS GMBH & CO) * the whole document * ---	1, 2, 5	
A	US-A-1 534 500 (BRAEMER ET AL) * the whole document * ---	1	
A	US-A-3 837 186 (LEFEBVRE ET AL) * the whole document * ---	2, 3	
A	EP-A-139 852 (H. KRANTZ GMBH & CO.) * the whole document * ---	4, 6	
A	WO-A-8 503 117 (OY WILH. SCHAUMAN AB) * the whole document * -----	7	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F26B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06 AUGUST 1991	Examiner SILVIS H.
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	