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Remarks:
Amended claims in accordance with Rule 86 (2) EPC.

(54) Method and apparatus for stretching synthetic yarns using steam as a heating means

(57) Method for stretching a thermoplastic synthetic yarns set, in the form of warp chain characterized in that steam is used as heating means, in the form of laminar jets directed on to the yarn transversally with respect to the direction run of the yarn.

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Description

FIELD OF THE INVENTION

The present invention relates to a method for stretching more or less interlaced thermoplastic yarns, characterized in that steam and the relative equipment are used as yarn heating means.

PRIOR ART

Some known methods for stretching synthetic yarns encompass an aqueous liquid bath maintained at the stretch temperature. The vat containing the thermostated liquid must be sufficiently large in the bath to realize a yarn path sufficiently long to allow the desired temperature to be reached.

Other known methods realize yarn heating by means of heating elements (plates or cylinders) on which the yarn is run. In other cases the yarn is passed in a chamber containing a gas (air) at a sufficiently high temperature.

These methods however do not allow a quick precise and constant with the time heating.

SUMMARY OF THE INVENTION

The method according to the present invention is based on the use of steam in the form of a series of laminar jets having a transversal direction with respect to that of the yarn run. The method and the corresponding equipment are directed to the stretch of a set of many yarns, in particular of a warp chain (or chain fraction).

In this device saturated steam is used, at the pressure usually available in the factory, in the order of 295 KpA.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 represents in a purely schematic manner the whole equipment comprising rollers F and F' system for controlling inlet and outlet velocity of the yarns D, heating plates B and B', a hot water wash device L, and diathermal oil heating system E.

Fig. 2 represents in detail the heating plates B and B' placed in a containment chamber C provided with steam inlet (through regulation group R) and residual non utilized steam discharge A.

Fig. 3 represents a section of the heating plate according to a vertical plane parallel to the yarn run.

Fig. 4 shows the path of the diathermal oil coil.

DETAILED DESCRIPTION OF THE INVENTION

The yarn fed at the heating and stretch equipment of Figure 1 is previously washed (device L) with hot water to remove the residual spinning oil, resulting detrimental to sizing operation, successive to stretching, and to prepare it to interlacing operation. The yarn is passed between the heating plates B, B' without coming into contact with them. The whole yarns beam (warp chain) is uniformly collided with numerous laminar jets of steam coming from the splits N of the heating plates B, B' as shown in Figure 3, wherein V indicates the steam supply chamber and G the closing plates fastened with screws H and placed next each other thus forming a small interstice in the order of 0.3 mm in order to form splits N parallel to the plates and transversal to the yarns direction. The equipment also encompasses conventional device R (Figure 2) for inlet steam pressure reduction and flow regulation.

The yarn is thus very quickly brought to the desired stretch temperature.

The heating regulation is carried out by varying the fed steam flow and the distance of the plates from the yarns beam : the distance between the lower and the upper plate, in the order of 7 cm, can be regulated.

A further possibility to regulate the heating is given by the fact that the steam supply chamber is provided inwardly with a coil M (Figures 3 and 4) in which diathermal oil flows, whose temperature is strictly controlled.

By means of the supplemental heat provided by the above coil, dispersion heat losses can be counterbalanced avoiding steam condensation in the steam chamber, moreover it is possible to regulate, within restricted limits, the steam jet temperature coming out from the splits.

The method according to the present invention has the advantage consisting in a very quick heating of the yarn and a high heating uniformity for all the yarns beam also in the case of warp chain, having a large number of yarns.

These advantages are due, besides to the use of steam as heating fluid, also to the steam use conditions in the form of numerous laminar jets, having specific disposition and direction.

As above said a further regulation possibility is given by the supplemental heating of the steam chamber by means of diathermal oil flowing through the coil inside the steam supply chamber.

Claims

1. A method for stretching a set of synthetic thermoplastic yarns in the form of warp chain characterized in that, as heating means of the yarn, steam is used in the form of laminar jets directed on to the yarn transversally with respect to the direction run of the yarn.

2. The method according to claim 1 wherein the fed yarn to be stretched is previously washed in hot water to remove the residual spinning oil.

3. The method according to claim 1 wherein low pressure saturated steam is used.

4. The method according to claim 1 wherein as supplemental heating means a device (coil) is used in which diathermal oil flows, placed inside the steam supply chamber.

5. Equipment for the realization of the stretching method according to claim 1,characterized in that it comprises heating plates B and B' supplying steam in the form of numerous laminar jets coming out from parallel splits (N) placed in said plates and having a perpendicular direction with respect to the yarn run (D).

6. The equipment according to claim 5 wherein the steam supply chamber (V) is provided inwardly with a coil (M) for supplemental heating suitable for diathermal oil circulation.

Amended claims in accordance with Rule 86(2) EPC.

1. A method for stretching a set of synthetic thermoplastic yarns in the form of warp chain characterized in that, as heating means of the yarns, steam is used in the form of laminar jets directed on to the yarns transversally with respect to the direction run of the set of yarns.

2. The method according to claim 1 wherein the fed yarns to be stretched are previously washed in hot water to remove the residual spinning oil.

3. The method according to claim 1 wherein low pressure saturated steam is used.

4. The method according to claim 1 wherein as supplemental heating means a device (coil) is used in which diathermal oil flows, placed inside the steam supply chamber.

5. Equipment for the realization of the stretching method according to claim 1, characterized in that it comprises heating plates B and B' supplying steam in the form of numerous laminar jets coming out from parallel splits (N) placed in said plates and having a perpendicular direction with respect to the yarns run (D).

6. The equipment according to claim 5 wherein the steam supply chamber (V) is provided inwardly with a coil (M) for supplemental heating suitable for diathermal oil circulation.

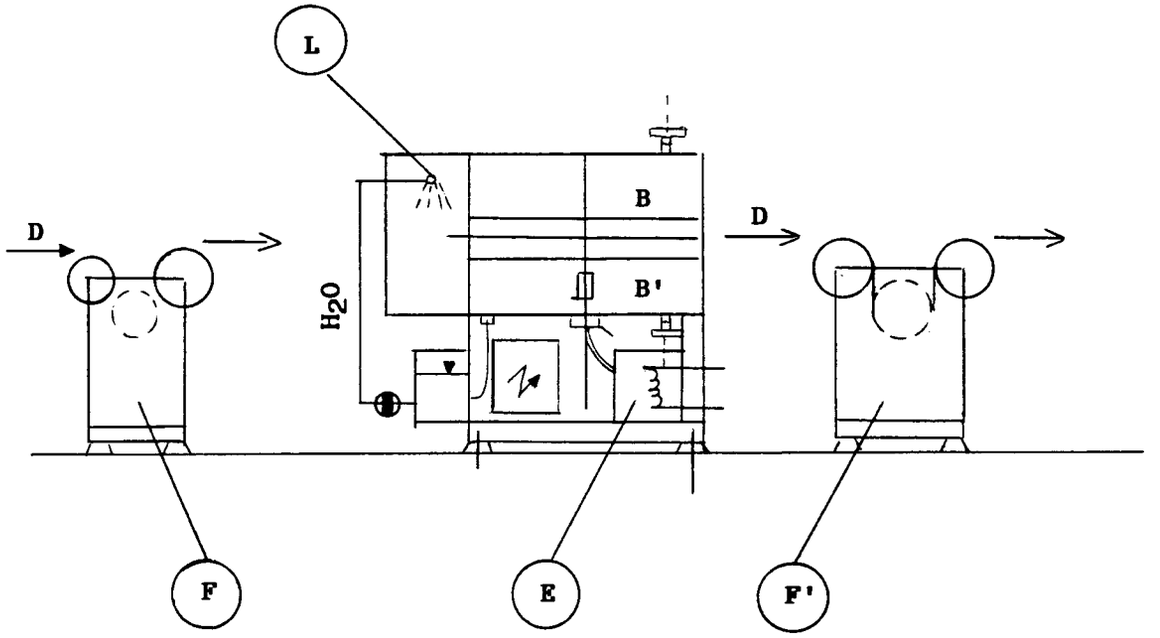

Fig. 1

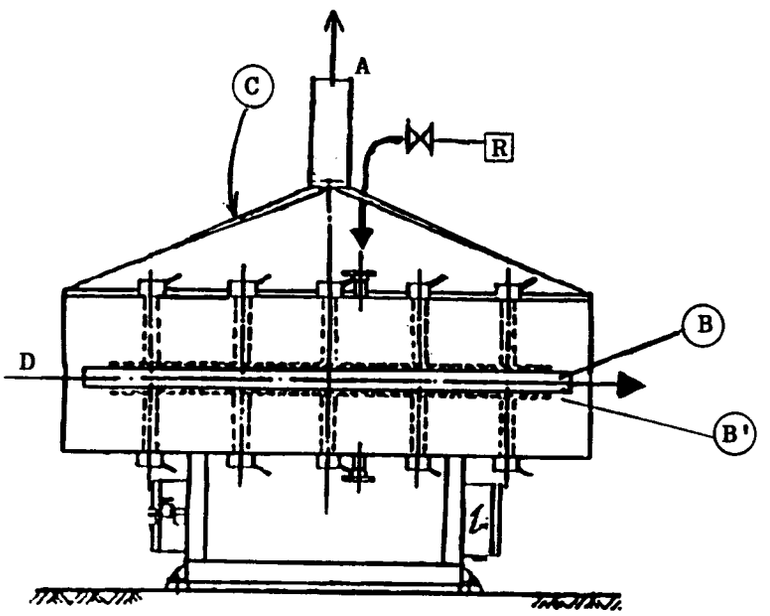

Fig. 2

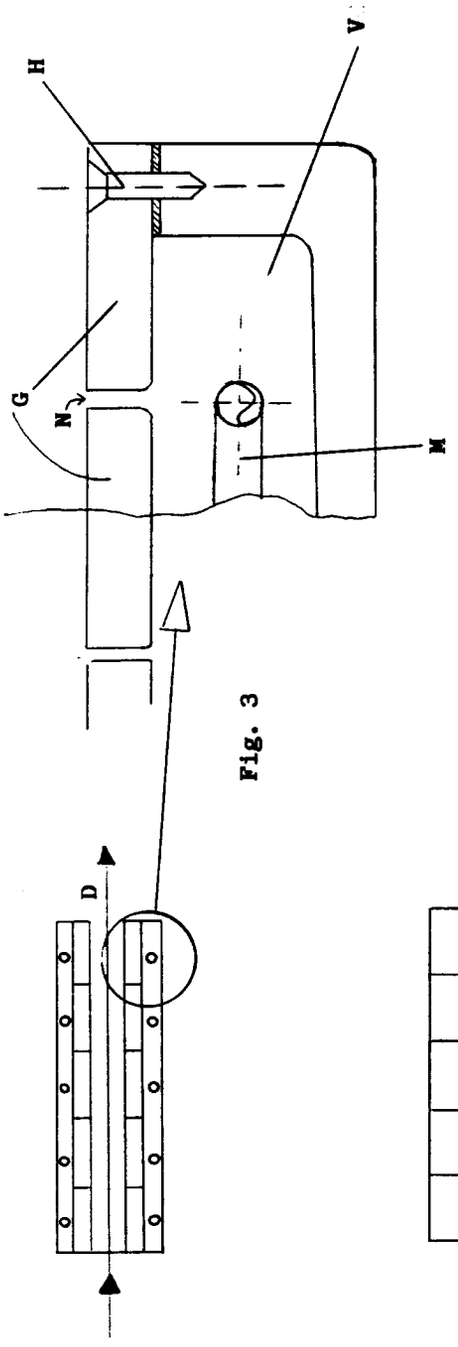

Fig. 3

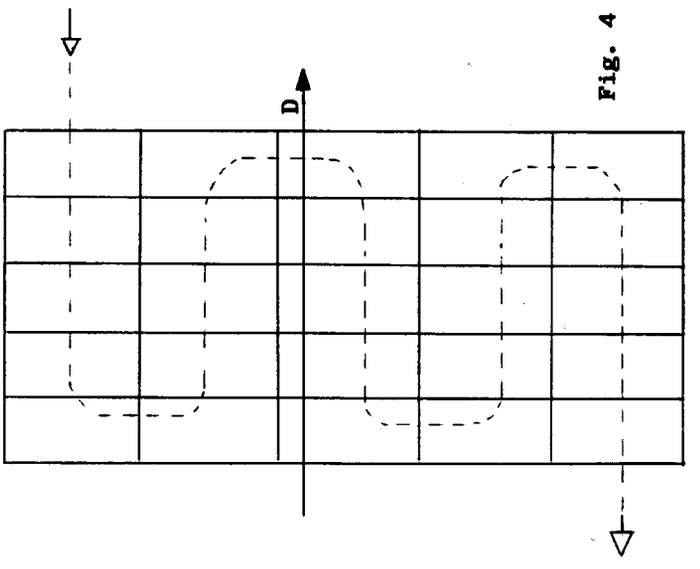

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 94 11 7582

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)
X	PATENT ABSTRACTS OF JAPAN vol. 018 no. 185 (C-1185) ,30 March 1994 & JP-A-05 339839 (MITSUBISHI RAYON CO LTD) 21 December 1993, * abstract *	1,3,5	D02J1/22
A	US-A-3 392 267 (BOSCH HUGO ET AL) * column 2, line 22 - column 4, line 75 *	1	
A	US-A-3 452 132 (PITZL GILBERT) * column 1, line 61 - column 5, line 27 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

D02J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 April 1995	V Beurden-Hopkins, S

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

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