

PATENT SPECIFICATION

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(54) PROCESS AND DEVICE FOR CONTINUOUS PRODUCTION OF FILAMENT YARNS FROM POLYMERS

(71) We, DIDIER ENGINEERING GMBH, a Company registered under the laws of the Federal Republic of Germany, of Alfredstrasse 28, 4300 Essen, Federal Republic of Germany do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and the following statement:-

The invention relates to a process for the continuous production of filament yarns from polymers, in particular from polyamides or polyesters, which are extruded and spun from the spinning nozzles of a spinning head and subsequently cooled, recrystallised, wetted, treated if necessary, stretched in a vertical quench duct and wound, and a device for performing this process.

DT-OS 19 43 658 discloses a process and a device for continuous production of a variety of synthetic threads, particularly polyamide and polyester-threads in which the polyamide or polyester-threads are spun from one or several spinning nozzles into a vertical quench duct. Whilst being drawn through the quench duct the threads are exposed to a cross-flow of air for the purpose of cooling and strengthening. Subsequently the threads pass through a spinning duct which is attached vertically downwards from the quench duct and is necessary for cooling and simultaneous onset of recrystallisation. After leaving the lower end of the spinning duct the threads are drawn vertically downwards past a godet roller for wetting, by means of a deflecting godet roller arranged below the godet roller for wetting, and then passed horizontally over a second deflecting godet roller, past a godet roller for treating, to a winding unit. The device for performing this process has a considerable requirement for vertical space, extending at least through two floors, whereby the winding unit stands on the lower floor, the

lower end of the spinning duct extends through the ceiling of the lower floor and the spinning duct with the quench duct joining it vertically upwards and the smelting head arranged above it extend through one or several floors of a building over it.

The object of the invention is to devise a process of the type mentioned at the beginning and a device for performing this process, which can be performed and accommodated respectively in a smaller space particularly on requiring one floor only.

According to the invention the problem is solved in that the threads which have already recrystallised inside the quench duct are drawn directly sideways from the lower end of the quench duct and led to the winding machine outside the quench duct.

In the process according to the invention the use of a spinning duct is thus completely dispensed with. Additionally the threads are not drawn off vertically downwards in direction of the quench duct but are drawn away sideways and led to the winding machine. In this way the vertical space requirement for performing the process is considerably reduced.

Even more space is being saved if the threads are led sideways from the lower end of the quench duct, sloping upwards to the winding machine, because then the winding machine can be placed next to the quench duct and on the same level.

Preferably the threads are treated and/or wetted before being drawn off sideways.

A device for performing the process according to the invention has a smelting extruder, a spinning head with spinning nozzles arranged above a quench duct, a godet roller for drawing off, at least one deflecting godet roller for treating and if necessary a godet roller for wetting and a winding machine. According to the invention the device is characterised in that the godet roller for drawing off is arranged in

20 MAY 1981

the lower part of the quench duct and is constructed as a deflecting godet roller. Arrangement and design of the godet roller for drawing off provide a further space saving. Leading the threads sideways and sloping upwards to the winding machine is advantageously achieved by designing so that the winding machine has a deflecting godet roller arranged above its winding spools and above the godet roller for drawing off. This arrangement also serves to produce a compact device.

To provide the required cooling, strengthening and recrystallisation for the threads, while they are still inside the quench duct, the godet roller for drawing off may itself be cooled in addition to supplying cooled quench air.

The quench duct may be at least partially constructed as a duct for treatment with steam to add moisture to the threads if necessary. One or more godet rollers for treatment can also be arranged within the quench duct without increasing the space requirement of the device.

The device becomes transportable - for example in commercial containers - if the unit comprising the smelting extruder and the quench duct is arranged next to and joined to the winding machine on a common frame.

Further characteristics, advantages and possibilities of application of the present invention will be appreciated from the details given below.

The invention may be put into practice in various ways and one specific embodiment will be described by way of example with reference to the accompanying drawing which is a diagrammatic illustration of the device arranged according to the invention for performing the process according to the invention.

A smelting extruder 1 is supplied with the required granulated material from a container 2. The molten material flows to the spinning head 3 which has spinning nozzles. Threads 6 are spun from the spinning nozzles of spinning head 3 into a vertical quench duct 4 arranged below spinning head 3. In the lower region of the quench duct there is a godet roller 5 for drawing off, which is constructed as a deflecting godet roller by which the threads 6 are drawn out of quench duct 4 and are led over a deflecting godet roller 7 to a winding machine 8. The deflecting godet roller 7 is above the winding spools 9 which are arranged symmetrically to the deflecting godet roller 7 so that all threads are traversing an equal distance. The axes of the godet roller 5 for drawing off, the deflecting godet roller 7 and the winding spools 9 are parallel. The unit comprising the smelting extruder 1 with the spinning head 3 and the

quench duct 4 is arranged on the same level as the winding machine 8, and they are preferably arranged on a common frame. They form a compact unit.

The godet roller 5 for drawing off may be cooled. A cooled cross flow of air is blown into quench duct 4 over its total height. To convert part of the quench duct to a steam duct, steam or moist air may be blown in. Godet rollers for wetting and/or treating may also be arranged inside the quench duct and this avoids any increase in the spatial dimensions of the device.

WHAT WE CLAIM IS:-

1. Process for continuous production of filament yarns from polymers which are extruded and spun from the spinning nozzles of a spinning head and subsequently cooled, recrystallised, wetted, treated if necessary, stretched in a vertical quench duct and wound, the threads being drawn directly sideways from the lower end of the quench duct, and recrystallised threads being led to the winding machine. 80
2. A process as claimed in Claim 1 in which the threads are led in a direction sloping upwards from the lower end of the quench duct to the winding machine outside the quench duct. 85
3. A process as claimed in Claim 1 or Claim 2 in which the threads are treated or wetted or both inside the quench duct before being drawn off sideways. 90
4. A device for performing the process as claimed in Claim 1 comprising a smelting extruder having a spinning head with spinning nozzles arranged above a quench duct, a godet roller for drawing off, at least one deflecting godet roller, a godet roller for treating and if necessary a godet roller for wetting and a winding machine outside the quench duct, the godet roller for drawing off being arranged in the lower part of the quench duct and constructed as a deflecting godet roller. 95
5. A device as claimed in Claim 4 in which the winding machine has a deflecting godet roller arranged above its winding spools at a level higher than the godet roller used for drawing off the threads from the quench duct. 100
6. A device as claimed in Claim 4 or Claim 5 in which the godet roller for drawing off is cooled. 105
7. A device as claimed in any one of the Claims 4 to 6 in which the quench duct is at least partially constructed as a duct for treatment of the threads with steam. 110
8. A device as claimed in any one of the Claims 4 to 7 in which one or more rollers for wetting or treating the threads are arranged in the quench duct. 115
9. A device as claimed in any one of Claims 4 to 8 in which the unit comprising the smelting extruder and the quench duct is 120 125 130



the lower part of the quench duct and is constructed as a deflecting godet roller. Arrangement and design of the godet roller for drawing off provide a further space saving. Leading the threads sideways and sloping upwards to the winding machine is advantageously achieved by designing so that the winding machine has a deflecting godet roller arranged above its winding spools and above the godet roller for drawing off. This arrangement also serves to produce a compact device.

To provide the required cooling, strengthening and recrystallisation for the threads, while they are still inside the quench duct, the godet roller for drawing off may itself be cooled in addition to supplying cooled quench air.

The quench duct may be at least partially constructed as a duct for treatment with steam to add moisture to the threads if necessary. One or more godet rollers for treatment can also be arranged within the quench duct without increasing the space requirement of the device.

The device becomes transportable - for example in commercial containers - if the unit comprising the smelting extruder and the quench duct is arranged next to and joined to the winding machine on a common frame.

Further characteristics, advantages and possibilities of application of the present invention will be appreciated from the details given below.

The invention may be put into practice in various ways and one specific embodiment will be described by way of example with reference to the accompanying drawing which is a diagrammatic illustration of the device arranged according to the invention for performing the process according to the invention.

A smelting extruder 1 is supplied with the required granulated material from a container 2. The molten material flows to the spinning head 3 which has spinning nozzles. Threads 6 are spun from the spinning nozzles of spinning head 3 into a vertical quench duct 4 arranged below spinning head 3. In the lower region of the quench duct there is a godet roller 5 for drawing off, which is constructed as a deflecting godet roller by which the threads 6 are drawn out of quench duct 4 and are led over a deflecting godet roller 7 to a winding machine 8. The deflecting godet roller 7 is above the winding spools 9 which are arranged symmetrically to the deflecting godet roller 7 so that all threads are traversing an equal distance. The axes of the godet roller 5 for drawing off, the deflecting godet roller 7 and the winding spools 9 are parallel. The unit comprising the smelting extruder 1 with the spinning head 3 and the

quench duct 4 is arranged on the same level as the winding machine 8, and they are preferably arranged on a common frame. They form a compact unit.

The godet roller 5 for drawing off may be cooled. A cooled cross flow of air is blown into quench duct 4 over its total height. To convert part of the quench duct to a steam duct, steam or moist air may be blown in. Godet rollers for wetting and/or treating may also be arranged inside the quench duct and this avoids any increase in the spatial dimensions of the device.

WHAT WE CLAIM IS:-

1. Process for continuous production of filament yarns from polymers which are extruded and spun from the spinning nozzles of a spinning head and subsequently cooled, recrystallised, wetted, treated if necessary, stretched in a vertical quench duct and wound, the threads being drawn directly sideways from the lower end of the quench duct, and recrystallised threads being led to the winding machine.

2. A process as claimed in Claim 1 in which the threads are led in a direction sloping upwards from the lower end of the quench duct to the winding machine outside the quench duct.

3. A process as claimed in Claim 1 or Claim 2 in which the threads are treated or wetted or both inside the quench duct before being drawn off sideways.

4. A device for performing the process as claimed in Claim 1 comprising a smelting extruder having a spinning head with spinning nozzles arranged above a quench duct, a godet roller for drawing off, at least one deflecting godet roller, a godet roller for treating and if necessary a godet roller for wetting and a winding machine outside the quench duct, the godet roller for drawing off being arranged in the lower part of the quench duct and constructed as a deflecting godet roller.

5. A device as claimed in Claim 4 in which the winding machine has a deflecting godet roller arranged above its winding spools at a level higher than the godet roller used for drawing off the threads from the quench duct.

6. A device as claimed in Claim 4 or Claim 5 in which the godet roller for drawing off is cooled.

7. A device as claimed in any one of the Claims 4 to 6 in which the quench duct is at least partially constructed as a duct for treatment of the threads with steam.

8. A device as claimed in any one of the Claims 4 to 7 in which one or more rollers for wetting or treating the threads are arranged in the quench duct.

9. A device as claimed in any one of Claims 4 to 8 in which the unit comprising the smelting extruder and the quench duct is

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mounted next to and on a common frame with the winding machine.

10. A device as claimed in Claim 4 substantially as specifically described herein with reference to the accompanying drawing.

11. A process as claimed in Claim 1 substantially as specifically described herein with reference to the accompanying drawing.

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