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PROCESS AND APPARATUS FOR THE CONTINUOUS  
PRODUCTION OF SYNTHETIC THRLADS

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2 Sheets-Sheet 1

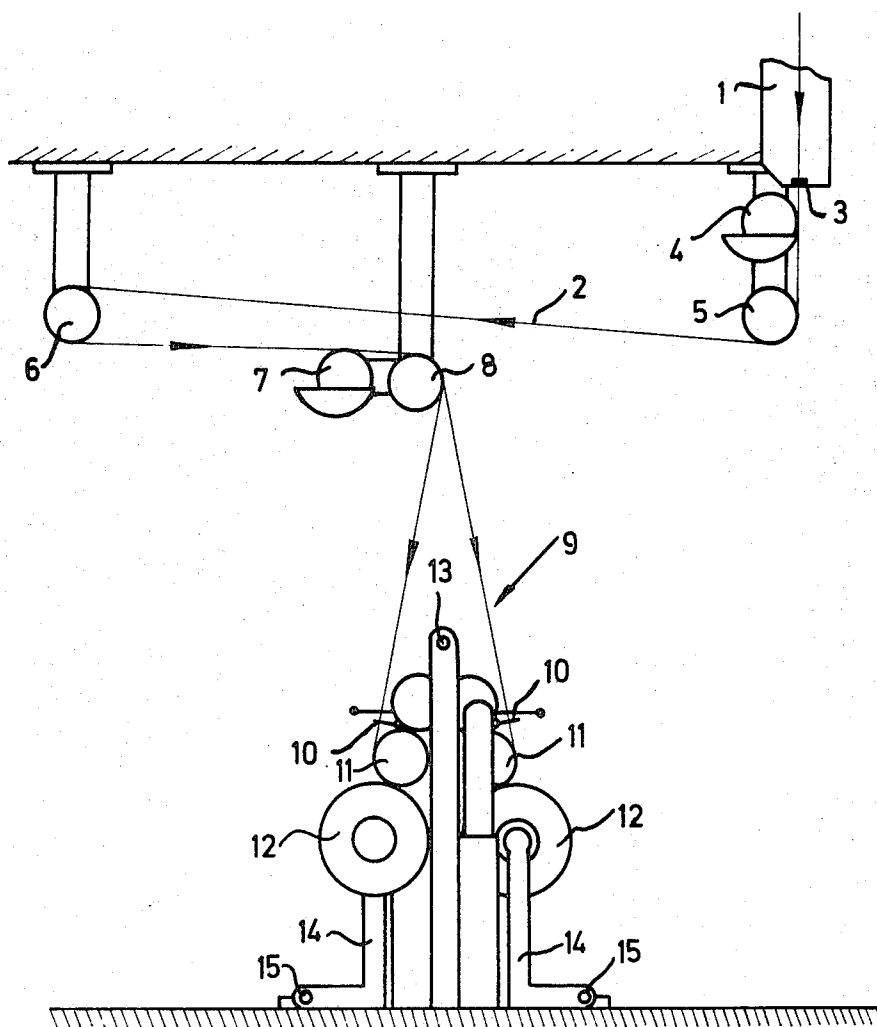


Fig. 1

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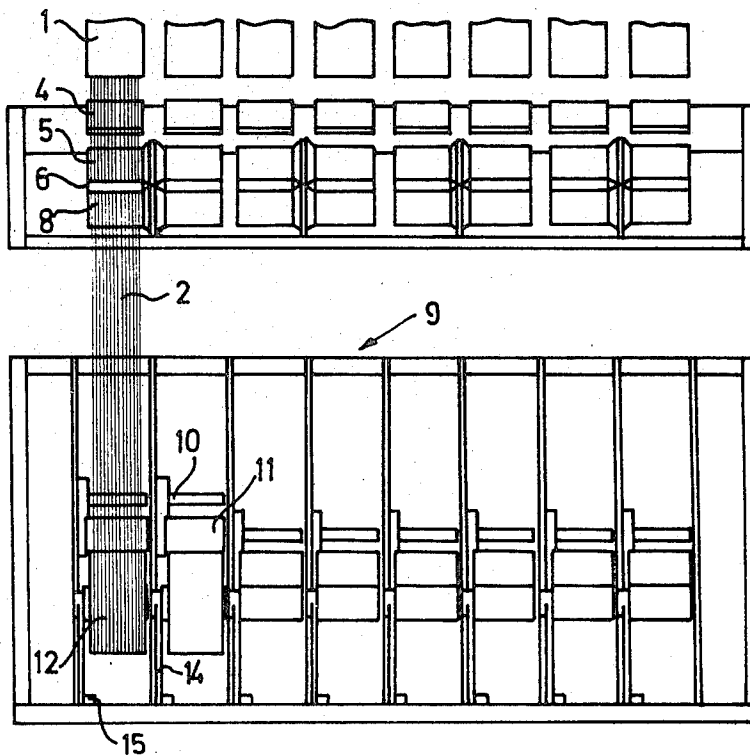


**Fig. 2**

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## PROCESS AND APPARATUS FOR THE CONTINUOUS PRODUCTION OF SYNTHETIC THREADS

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U.S. Cl. 242—35.5 R

11 Claims

### ABSTRACT OF THE DISCLOSURE

A process for the continuous production of a large number of synthetic threads wherein the thread path after leaving the spinning shaft up to the preparation godet extends horizontally. Moreover, the thread path from the moistening godet to the winding spool preferably extends more than five meters. Apparatus for carrying out the process is also described.

### BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a process for the continuous production of a large number of synthetic threads, especially of polyamid or polyester threads, which after emergence from a spinning nozzle are solidified in a blowing shaft and/or spinning shaft and are thereupon stretched and/or spooled.

For the continuous production of endless synthetic threads, thermoplastic material is commonly fed in a molten state over a conveyor or dosing apparatus to a spinning nozzle plate situated in a spinning head. The material is pressed through the bores of the head and is shaped into monofile or multifile threads having diverse thread cross sections. After emergence from the spinning nozzle, the still plastic threads pass into a blowing shaft where they are blown with air for the purpose of cooling and solidification. The threads then pass to a spinning shaft, at the end of which they are drawn off at a high velocity and wound. In the winding or spooling of freshly spun synthetic threads, the multifile and monofile threads dropping through the spinning shaft to the spooling machine are conducted over two moistening and preparation godets, as well as over deflection godets, to the winding body. In the known processes, the thread course runs substantially vertically from the spinning nozzle plate to the winding body and is deflected several times, by 180°. Most conventional winding processes are suited only for the winding or spooling of one or two threads which fall from a spinning shaft. More recent devices frequently use spinning apparatus in which several spinning nozzle plates are provided in each spinning head. Accordingly, a plurality of threads can be generated simultaneously, and a plurality of winding apparatus must be provided to accommodate the increased thread production. In order to wind the plurality of threads, there have been attempts to modify conventional spooling processes originally designed for the winding of one or two threads per spinning head. A winding device of this type is shown in German utility model 1,955,042 for the simultaneous winding of, for example, eight monofile threads. In this apparatus, the threads which drop from one or more rows of spinning nozzles through the spinning shaft to the spooling machine are conducted parallel over a moistening godet and preparation godet and pass from a lower to an upper deflection godet where the threads are deflected from their hitherto nearly parallel thread course. Then the threads are turned on their axes and supplied

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to a winding body at a greater distance and to a winding body at a lesser distance from the upper deflection godet. Because of the close arrangement of the individual godets and winding bodies, as well as the added structures projecting from the longitudinal plane of the machine at an angle of 90° for the reception of the deflection godets, the maintenance and operation of the machine is extremely difficult. For reasons of space-saving the winding bodies are closely staggered into two planes on the front side of the machine. This creates a danger that the threads from one winding will be taken up by the adjoining winding, and thereby both windings will be rendered unusable. A further disadvantage is that all the threads spun from one or several rows of nozzles, in view of their thread guidance and the length of the thread path, are subjected to different conditions which render the thread non-uniform. The moisture absorption of the individual threads is different depending on the thread path involved. The spooling speed of the threads is also limited, since the threads which have the shortest thread path to cover have to be guided so slowly that they at least have the possibility of absorbing sufficient moisture, while the threads which have to cover the longer thread path have long been saturated with moisture. Thus, the requisite thread moisture to air moisture equilibrium could be arrived at by increasing the spooling speed of only part of the threads or by further increasing the pooling speed in none of the threads. Further, the relatively space-wasting manner of construction of this spooling apparatus prevents an arrangement in which the spinning shafts and the preceding units are closely adjacent to one another or in succession, since the preparation, moistening and deflecting godets, as well as the winding bodies, even in the case of staggered arrangement, demand a larger space than the spinning shafts.

Underlying the invention, therefore, is the problem of avoiding the above-mentioned disadvantages and of creating a process, as well as an apparatus, suited for the winding of a large number of synthetic threads, which, with small space requirement, permits a substantial increase of the spooling speed, and through uniform gentle treatment of all threads, also guarantees winding bodies of uniform quality.

According to the preferred form of the invention, this is accomplished by providing a thread path from the spinning shaft to the preparation godet which extends essentially horizontally. According to another feature of the invention, the threads from the thread formation to the winding spool are conducted parallel to one another and each thread covers the same path length from the thread formation to the winding spool.

The use of the invention in the described manner offers several advantages. For example, the path length of the threads from the spinning shaft to the winding is considerably increased. Moreover, the thread path to the winding spool is not bent, but merely deflected at the deflection rollers. The threads are conducted free of contact among one another and parallel to the winding members, whereby a climbing over on the godets an mutual scrapping are avoided. Since each thread covers the same path length, all threads are subjected to exactly the same process conditions, and for each thread, regardless of its place within the thread group, there is available the same time for absorption of moisture and of preparation, before it reaches the winding body. As a result, quality fluctuations of the thread groups among one another are avoided. Moreover, a substantial contribution is made to an equalization and improvement of the overall quality of the thread groups.

## DESCRIPTION OF THE DRAWINGS

These and other advantages and features of the present invention will hereafter appear, for purposes of illustration, but not of limitation, in connection with the accompanying drawings wherein like numbers refer to like parts throughout, and wherein:

FIG. 1 is a schematic side elevational view of a preferred form of apparatus for carrying out the preferred process described herein; and

FIG. 2 is a schematic front elevational view of the apparatus shown in FIG. 1.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

According to the preferred process aspect of the invention, the thread path from the moistening godet to the winding spool has a length of 4 to 9 meters, preferably more than 5 meters. Many synthetic threads, especially those of polyamides and polyesters, can be produced at an elevated spinning speed, and therefore, also an increased spooling speed, which contributes to the economy of manufacture. However, the threads must be provided with sufficient time to absorb the moistening and the preparation, which is achieved by providing a thread path of preferably more than 5 meters.

The threads are conducted without distortion over the moistening, preparation and deflection godets to the winding reel. Through this step, differing tensions and differing stresses, as well as any compulsory twisting of the thread, are excluded. Accordingly, an effective contribution is made to an equalization with respect to the stretchability and the quality of the thread group.

It has proved advantageous for the length of the thread path from the moistening godet to the preparation godet to relate to the length of the thread path from the preparation godet to the winding as 3:1. During the time which is required for the threads to travel from the spinning shaft to the winding spool, they undergo a series of physical changes. The threads absorb moisture from the moistening roller and/or from the air surrounding them, and further crystallize out. Moreover, they change slightly their length and undergo an increase of their light refraction. By using the indicated thread-path ratio, the above described moisture equilibrium and the physical changes take place before the threads come in contact with the preparation, which, without influencing these changes, can distribute itself on the thread surface during the rest of the thread path.

A preferred device for executing the process is a winding device comprising two essentially separate machine units. One machine unit accommodates the friction and winding spools, and the other machine unit accommodates the moistening, preparation and deflection godets. By using this apparatus, the space required for the winding device is reduced to a considerable extent. By arranging the individual pinning heads next to one another, it is also possible to accommodate the spinning shafts, blowing shafts and spinning heads, as well as all the preceding spinning devices, closely next to one another, thereby reducing the space requirement of the overall apparatus. The maintenance of the individual pinning heads (winding places) is also facilitated by arranging them surveyably without hampering godets or other additional structures extending into the operating space. Automated spool changing devices, as well as stretching devices, can be provided in various modifications. The stability of the machine frame is to be achieved by simple provisions, since the vibration tendencies are strongly reduced by the division of the machine into two essentially separate machine units.

An advantageous construction of the device is characterized in that the deflection godet for the vertical deflection of the threads is arranged in a middle zone between and below the deflection godets for the horizontal deflection. This feature achieves optimal utilization of the space, espe-

cially in respect to the setting up of several winding units in succession or adjacently to one another.

The apparatus is expediently constructed in such a way that all the godets are arranged axially parallel to the winding spool. Through this arrangement of the godets, a twisting, distortion and bending of the threads does not occur. Thus, the threads are conducted in a gentle manner, parallel to one another, from the spinning shaft, over all the godets, up to the winding spool.

Advantageously, the horizontal guidance of the threads takes place at a right angle to the longitudinal axis of the machine, whereby accessible thread guidance is easily achieved. According to another feature of the invention, the winding apparatus is constructed two-sided, whereby optimal space utilization and optimal thread winding is achieved.

Referring to the drawings, a viscous plastic melt is pressed through a spinning nozzle plate situated in a spinning head (not shown) in order to form threads. The threads are conducted from the spinning nozzle plate through a blowing shaft (likewise not shown). After the threads have been solidified in the blowing shaft by blowing with air or another gas, they fall through a spinning shaft 1 down to the winding apparatus. At the bottom of the spinning shaft, the threads are first conducted through a separating thread guide 3, which separates the threads from one another. After passing through the separating thread guide 3, the threads are wetted with moisture by a moistening godet 4 which turns in a bath. The moistening godet 4 is followed by a deflection godet 5, which deflects the vertical thread course into a nearly horizontal thread course. The thread 2 is conducted for a relatively long distance to a second deflection godet 6, where it is again deflected through an angle of 180°. The thread is then conducted to a deflection godet 8 over a nearly horizontal path which amounts to about half the length of the path from the first godet 5 to the second deflection godet 6. On the path to godet 8, the thread contacts a preparation godet 7 which turns in a preparation bath. Godet 7 coats the threads with the preparation in a well-known manner. The thread is then deflected by a deflection godet 8 from its horizontal thread course through about 90° to a nearly vertical downward thread course. The deflection godets 5, 6, and 8, as well as the preparation godets 4 and 7, are stationarily mounted in a suitable manner on a space cover or intermediate ceiling. With two-sided execution of the winding unit 9, the thread group conducted in common up to the deflection godet 8 is divided and fed to both sides of the winding unit 9. In the case of one-sided execution, correspondingly, all the threads of a thread group are fed to one side of the winding unit 9.

The threads are distributed by mean of a traverse device 10 on one or several winding spools 12. The winding unit 9 is provided with a suction draw-off installation 13 which, in the case of spinning-on or breaking of the threads 2, conducts these threads out of the working zone. The winding spools 12 are removably mounted on angle arms 14. Angle arms 14 are provided at their lower outward pointing end with a fixed pivot bearing 15, which permits a hinging off of the winding spools 12 from the winding unit 9.

Those skilled in the art will recognize that the embodiments described herein may be altered and modified without departing from the true spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. In a system for the continuous production of a plurality of synthetic threads, improved apparatus for winding the threads comprising:

moistening means for moistening the thread;

preparation means for applying a preparation to the threads;

first and second godet means between the moistening means and the preparation means for forming a first thread path that is substantially horizontal;

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spool means for winding the thread; and  
third godet means between the preparation means  
and the spool means for forming a second thread  
path that is nonhorizontal, whereby each of the  
thread paths has an equal length.

2. Apparatus, as claimed in claim 1, wherein the  
thread path from the moistening means to the spool means  
has a total length exceeding five meters.

3. Apparatus, as claimed in claim 1, wherein the length  
of the thread path from the moistening means to the  
preparation means relates to the length of the thread path  
from the preparation means to the spool means as 3:1.

4. Apparatus, as claimed in claim 1, wherein the  
moistening means, preparation means, and spool means  
comprise one machine unit, and the spool means com-  
prises part of an independent machine unit.

5. Apparatus, as claimed in claim 1, wherein the third  
godet means is arranged between and below the first and  
second godet means.

6. Apparatus, as claimed in claim 1, wherein the axes  
of the first, second and third godet means are arranged  
parallel to the axes of the spool means.

7. Apparatus, as claimed in claim 1, wherein the first  
thread path is perpendicular to the axes of the spool  
means.

8. Apparatus, as claimed in claim 1, wherein the spool  
means comprises first and second spools that each receive  
thread from the second thread path.

9. In a process for continuous production of a plurality  
of synthetic threads by melt-spinning, an improved meth-  
od for winding the threads comprising the steps of:

conducting the threads in a substantially vertical direc-  
tion;

moistening the threads;

deflecting the threads from a substantially vertical to  
a substantially horizontal direction;

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conducting the threads in a substantially horizontal di-  
rection along a first path having a first length;  
deflecting the threads through an angle of about 180  
degrees;

conducting the threads along a second path substan-  
tially parallel to the first path, said second path  
having a second length;

deflecting the threads along a substantially vertical  
downward third path having a third length that is  
substantially shorter than the combined first and  
second lengths; and

winding the threads on a spool, whereby each of the  
threads is conducted through the same distance.

10. A method, as claimed in claim 9, wherein the com-  
bined first, second and third lengths exceeds 5 meters.

11. A method, as claimed in claim 9, wherein the com-  
bined first and second lengths relate to the third length  
substantially as 3:1.

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