

12

EUROPEAN PATENT SPECIFICATION

43 Date of publication of patent specification: **09.01.91**

51 Int. Cl.⁵: **D 02 G 1/02**

21 Application number: **87103605.9**

22 Date of filing: **12.03.87**

54 **False twist crimping machine.**

43 Date of publication of application:
14.09.88 Bulletin 88/37

45 Publication of the grant of the patent:
09.01.91 Bulletin 91/02

84 Designated Contracting States:
CH DE FR GB IT LI

56 References cited:
US-A-3 367 096
US-A-3 449 898
US-A-3 955 351
US-A-3 956 878
US-A-4 173 860

CHEMIEFASERN TEXTILINDUSTRIE, vol. 37/89,
no. 2, February 1987, pages 102,103,106,
Frankfurt a.M., DE; J. BRUSKE et al.:
"Bedeutung der Texturierzonenlänge für den
Falschdrahttexturierprozess"

CHEMIEFASERN TEXTILINDUSTRIE, vol. 31, no.
4, April 1981, pages 286-289, Frankfurt a.M., DE;
M. BROSSMER: "Stand und Tendenzen bei der
Entwicklung von Texturierheizern"

73 Proprietor: **Murata Kikai Kabushiki Kaisha**
(Murata Machinery, Ltd.)
3-banchi, Kishoin-Minamiochiai-Cho
Minami-ku Kyoto-shi Kyoto-fu (JP)

72 Inventor: **Takai, Hidenori**
2-52-33, Ozu-cho
Iwakuni-shi Yamaguchi-ken (JP)

74 Representative: **Glawe, Delfs, Moll & Partner**
Patentanwälte
Postfach 26 01 62 Liebherrstrasse 20
D-8000 München 26 (DE)

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European patent convention).

Description

This invention relates to a false twisting machine according to the preamble part of claim 1, and method for false twisting filaments, fibers and yarns such as those made of nylon or like other synthetic materials, and more particularly, to such a machine and method in which a heater for heating filaments, fibers and yarns has a length extremely shorter than a conventional one.

In false twisting, it is an essential requirement to heat filaments of a yarn in a false twisting zone in order to impart crimpiness to the filaments, and hence a false twisting machine is necessarily provided with a heater. In recent years, the feeding speed of a yarn becomes higher and higher so that the length of the heater has to be made greater so as to ensure a desired heating period of time. In fact, with a false twisting machine having a feeding speed of above 500 meters per minute, there is employed a heater having a length of above 1.5 m, or usually about 2.0 m in the case of a contact-type heater. Today, a lot of nylon fibers have been employed for making panty stockings, tights or the like, and in cases where these nylon fibers are false twisted, the nylon fibers are heated, similar to fibers of other synthetic materials, to a relatively low temperature by means of a heater having a length of 2 m or therearound.

In a false twisting machine, it is intrinsically desirous to arrange feed rollers, a heater, and a twisting means on a straight line, but because of the use of such a long heater, which is usually disposed vertically or obliquely so as to avoid an increase in width or lateral dimensions of the machine from the view point of workability, these members can not be arranged in a straight manner. The reason for this is that if they are arranged on a vertical or oblique straight line, the height of the machine will be too large, for example, more than 4 m high, and hence become uneconomical and low in workability. Accordingly, to avoid this, the feed rollers, the heaters and twisting means are compelled to be disposed on a curved or bent line. Specifically, as shown in Figure 1, the path of the yarn is bent at a location between a pair of feed rollers 3 and a heater 4, or at a location between a heater 4 and a twisting means 5, as shown in Figure 2.

Such an arrangement, however, has the disadvantage that the transmission of a twisting motion of the yarn is reduced at a location in which the yarn is bent. Further, as the length of the heater increases, the height of the false twisting machine becomes greater, for example, 3 m or more, so that the building, in which the machine is installed, will be higher, thus increasing the construction cost for the building as well as the production cost of the machine itself. In addition, a worker has to set the yarn on the machine by using a long rod so that working efficiency will be reduced. Also, maintenance of the machine will be difficult and inefficient.

A false twisting machine according to the preamble part of claim 1 is known from US—A—3 955 351. Due to the fact that in this machine a relatively small heater having a length of about 2 feet is used only a rather low heating speed of about 150 m/min can be attained.

In US—A—4 173 860 a false twisting process is disclosed in which the yarn is high twisted in the early stage at room temperature before drawing at a high draw ratio. The known process uses relatively thick yarns, and therefore the self-heating produced during drawing is sufficient so that the process can be conducted without a heater. On the other hand, when using thin yarns, an additional heater would be necessary and it is not apparent in which way the heater could be arranged.

In a further false twisting process disclosed in US—A—3 956 878 feeding speeds of about 1500 m/min are used, however, this process is applicable only to polyester filament yarn which have much restricted characteristics such as birefringence, crystallinity and break elongation. Furthermore, as in the above mentioned process also a long heater has to be used.

It is therefore an object of the invention to provide a false twisting machine and method in which the filaments of a yarn can be sufficiently crimped with the use of a heater having a length of less than 1,0 m.

This object is achieved by a false twisting machine having the features given in claim 1 and by a false twisting method as it is given in claims 6 and 7, respectively; the dependent claims are related to further developments of the invention.

According to the present invention, the length of the heater can be greatly reduced, as compared with that of a conventional heater which has been considered necessary in the prior art false twisting technique, by maintaining the heater at a relatively higher temperature while taking account of self heating during drawing and/or false twisting of the nylon yarn. As a consequence, it becomes possible to arrange the feed rollers, the heater and the false twisting means on a straight line so that the height of the false twisting machine can be made less than 2.5 m, preferably within the reach of a worker.

A few examples of a false twisting machine constructed in accordance with the present invention are illustrated in comparison with conventional machines in the accompanying drawings, in which:

Figure 1 is a schematic view showing a conventional false twisting machine;

Figure 2 is a schematic view showing another conventional false twisting machine;

Figure 3 is a schematic view showing a false twisting machine in accordance with the present invention;

Figure 4 is a schematic view showing a conventional false twisting machine for undrawn and partially drawn yarns;

Figure 5 is a schematic view showing another conventional twisting machine for partially drawn and fully drawn yarns;

Figure 6 is a graphic representation of Table 1, showing the results of Example 1;

EP 0 281 657 B1

Figure 7 is a graphic representation of Table 2, showing the results of Example 2;
Figure 8 is a graphic representation of Table 3, showing the results of Example 3;
Figure 9 is a schematic view showing a false twisting machine employed for a Test Example;
Figure 10 is a graphic representation of Table 4, showing the case of out-drawing in which the feeding
speed is 800 meters per minute; and
Figure 11 is a graphic representation of Table 4, showing the case of in-drawing in which the feeding
speed is 800 meters per minute.

Description of special embodiments

Referring first to Figure 4, there is shown a conventional false twisting machine of out-drawing type for undrawn yarns (referred to as U.D.Y.) and partially drawn yarns (referred to as P.D.Y.), the machine being adapted to draw a yarn between a pair of first feed rollers 2 and a pair of second feed rollers 3. In this connection, however, the yarn can also be drawn between the second feed rollers 3 and a pair of delivery rollers 6. The false twisting machine illustrated in Figure 4 includes a supply bobbin 1 for supplying an untreated nylon yarn 1', the pair of first feed rollers 2, the pair of second feed rollers 3 disposed downstream of the first feed rollers 2, a heater 4 in the form of a contact-type heater for heating the untreated nylon yarn 1' fed from the second feed rollers 3, a false twisting means 5 for imparting a twist to the yarn 1' for crimping treatment thereof, the pair of delivery rollers 6 disposed downstream of the false twisting means 5, and a winding means 7 for winding up the crimped yarn 1' delivered from the delivery rollers 6.

Figure 5 shows another conventional false twisting machine of in-drawing type for partially drawn yarns (P.D.Y.) and fully drawn yarns (F.D.Y.). This machine has only one pair of feed rollers 3 and is adapted to draw a yarn only between the feed rollers 3 and a pair of delivery rollers 6. The construction of this in-drawing type machine is similar to that of the out-drawing type machine as illustrated in Figure 4 except for the first feed rollers 2 being omitted.

An untreated yarn in the form of an undrawn nylon yarn (U.D.Y.) was subjected to a false twisting treatment by means of the out-drawing type false twisting machine as illustrated in Figure 4. Similarly, an untreated yarn in the form of a partially drawn nylon yarn (P.D.Y.) was subjected to a false twisting treatment by means of the in-drawing type false twisting machine as illustrated in Figure 5. In both cases, the distance D between the feed rollers 3 and the upstream end of a heating portion of the heater 4 was set 150 mm, and the length L of the heater 4 was varied so as to change the temperature of the heater. Also, for comparison, a fully drawn nylon yarn (F.D.Y.) was likewise subjected to a false twisting treatment by means of the in-drawing type machine as illustrated in Figure 5. The yarns treated in this manner were respectively knitted into fabrics by the use of a lab circular knitting machine which had a cylinder diameter of 3.5 inches and 240 needles. The elasticities of the respective fabrics thus obtained were measured in the following manner.

$$\text{elasticity } K = \frac{L_2 - L_1}{L_1} \times 100 (\%)$$

where L_1 is the length of a fabric in a minute after a measuring load is applied to the fabric of a measuring length.

The following Examples 1 and 2 relate to a nylon yarn of 15 denier (De) including 5 filaments and a nylon yarn of 35 De including 10 filaments, respectively. The test results thereof are shown in Tables 1 and 2 and in Figures 6 and 7. For comparison, a partially drawn nylon yarn (P.D.Y.) of 70 De including 24 filaments and a fully drawn yarn (F.D.Y.) of the same size were false twisted by the in-drawing type false twisting machine as illustrated in Figure 5, and the elasticities thereof were measured. The results obtained are shown in Table 3 and in Figure 8.

Example 1

untreated yarns used: A. . . nylon 6 U.D.Y. 15 De/5 F
B. . . nylon 6 P.D.Y. 15 De/5 F
C. . . nylon 6 F.D.Y. 15 De/5 F

machines used: A. . . out-drawing type of Figure 4
B, C. . . in-drawing type of Figure 5

distance D between the feed rollers 3 and the heating portion upstream end of the heater 4: 150 mm
feeding speed: 900 m/min

EP 0 281 657 B1

heater length L(m/m)	0	100	300	500	800	1000	1500	2000
heater temp. (°C)	—	230	210	200	190	160	160	158

rate of drawing	A	B	C
between rollers 2 and 3	2.9	—	—
between rollers 3 and 6	1.2	1.35	1.06
total rate of drawing:	3.5	1.35	1.06

TABLE 1

untreated yarn used heater length	A (U.D.Y.) 15 De/5 F	B (P.D.Y.) 15 De/5 F	C (F.D.Y.) 15 De/5 F
	elasticity	elasticity	elasticity
0 (m/m)	159 (%)	146 (%)	51 (%)
100	250	248	111
300	441	425	321
500	442	442	380
800	441	440	429
1,000	422	418	421
1,500	381	380	378
2,000	382	377	380

Example 2

yarn used: nylon 6 P.D.Y. 35 De/10 F

machine used: in-drawing type of Figure 5

distance D between the feed rollers 3 and the heating portion

upstream end of the heater 4: 150 mm

feeding speed: 700 m/min

heater length L(m/m)	0	100	300	500	800	1000	1500	2000
heater temp. (°C)	—	230	230	210	190	160	160	160

rate of drawing: 1.3

initial load: 24 g

measuring load: 2 Kg

EP 0 281 657 B1

TABLE 2

untreated yarn used	P.D.Y. 35 De/10 F
heater length	elasticity
0 (mm)	110.2 (%)
100	195.0
300	232.1
500	257.6
800	256.3
1,000	254.5
1,500	241.2
2,000	239.7

Comparison Example

yarn used: A nylon 6 P.D.Y. 70 De/24 F

B nylon 6 F.D.Y. 70 De/25 F

machine used: A, B . . in-drawing type of Figure 5

distance D between the feed rollers 3 and the heating portion

upstream end of the heater 4: 150 mm

feeding speed: 700 m/min

heater length L(m/m):	0	100	300	500	800	1000	1500	2000
	—	230	230	230	210	200	175	165

rate of drawing: A . . 1.2

B . . 1.01

initial load: 24 g

measuring load: 2 Kg

TABLE 3

untreated yarns used	A (P.D.Y.) 70 De/24 F	B (F.D.Y.) 70 De/24 F
heater length	elasticity	elasticity
0 (mm)	81.8 (%)	37.4 (%)
100	98.2	42.1
300	115.1	61.7
500	132.7	82.5
800	158.3	123.1
1,000	192.9	149.2
1,500	190.4	158.3
2,000	182.2	161.1

As seen from Figures 6 and 7, the undrawn nylon yarns and the partially drawn nylon yarns of 15 De and 35 De have high and stable elasticities of knitted fabrics if the length of the heater is greater than 300 mm, and it is found that false twisted yarns of sufficiently good quality can be obtained even if the heater length is less than 1,000 mm, and particularly less than 800 mm, but greater than 300 mm. On the other hand, however, in case of the fully drawn nylon yarn, the elasticity of knitted fabric thereof is insufficient with the heater length ranging from 300 mm to 800 mm. Also, from Table 3 and Figure 8 showing the test

EP 0 281 657 B1

results of the Comparison Example, it can be seen that with the nylon yarn of 70 De, the elasticity thereof is low if the heater length is less than 800 mm. In this manner, in the false twisting treatments of the undrawn nylon yarn and the partially drawn nylon yarn, sufficiently high elasticities can be obtained by the use of a short heater. The reason for this is considered as follows: at the time when the yarn is being drawn or when the yarn is fed to the false twisting zone and being twisted there, it is self heated under the action of rearrangement of nylon filament molecules and/or friction between filaments of the yarn, and then heated by means of the heater before it has been cooled enough so that the yarn can be heated to a required temperature even with a relatively small quantity of heat given from the heater. To confirm this, temperature variations on the surface of the nylon yarn were measured at locations I, II and III between the first feed rollers 2 and the heater 4, as illustrated in Figure 9. The test conditions for such measurements are shown in the following Test Example, and the results obtained are shown in Table 4, of which the temperatures, measured at the respective measuring points at the feeding speed of 800 m/min, are illustrated in Figures 9 and 10.

Test example

Using the untreated yarns and the false twisting machines as specified below, the temperatures of the yarns were measured at locations I, II and III as illustrated in Figure 9 by means of a temperature detector. The same tests were carried out by varying the feeding speeds of the yarns.

yarns used:	U.D.Y. 30 De/10 F	P.D.Y. 30 De/8 F		F.D.Y. 15 De/5 F×2
machines used:	A out-draw of Figure 4	B out-draw of Figure 4	C in-draw of Figure 5	D in-draw of Figure 5
rate of drawing between rollers 2 & 3:	3.45	1.30	—	—
rollers 3 & 6:	1.00	1.00	1.30	0.93

heater length: 500 mm
heater temp.: 180°C
room temp.: 22°C

TABLE 4

feeding speeds (m/min)	500	600	700	800	900	1000
	yarn temperatures (°C)					
A (U.D.Y., out-drawn)						
I	63.1	65.3	65.8	64.5	63.6	63.7
II (Twist)	36.8	40.4	42.2	44.9	46.4	48.4
(Free)	30.0	31.9	31.8	34.3	34.3	35.8
II (Twist)	31.0	33.1	33.7	34.0	34.5	37.1
(Free)	25.9	28.6	29.5	30.9	31.8	33.4
B (P.D.Y., out-drawn)						
I	35.0	35.5	36.1	36.6	37.1	37.1
II (Twist)	38.0	40.5	40.7	42.1	43.4	43.2
(Free)	30.0	30.6	31.2	32.5	33.1	33.2
II (Twist)	31.9	33.1	33.5	32.0	32.6	33.7
(Free)	27.3	28.9	28.4	29.0	28.5	29.0
C (P.D.Y., in-drawn)						
II (Twist)	32.0	35.4	35.9	37.1	36.7	38.0
(Free)	27.2	27.8	27.8	28.3	27.7	27.8
III (Twist)	28.6	29.3	30.0	30.8	31.8	31.2
(Free)	23.7	23.6	24.0	24.1	24.5	24.2
D (F.D.Y., in-drawn)						
II (Twist)	31.4	34.6	34.1	35.0	35.8	37.0
(Free)	26.9	26.7	27.3	27.4	27.9	28.5
III (Twist)	26.9	27.1	27.7	27.9	27.2	26.1
(Free)	23.7	22.8	23.1	22.3	21.2	22.2

The results given in Table 4 for the case of a feeding speed of 800 m/min are graphically illustrated in Figure 10 and 11 for the case of out-drawn and in-drawn yarn, respectively. The abbreviation P.O.Y. (Partially Oriented Yarn) used in Figure 10 and 11 has the same meaning as P.D.Y. (Partially Drawn Yarn) used in the foregoing description. As illustrated in Figure 10 and 11 and shown in Table 4, the temperatures of the undrawn nylon yarn and the partially drawn nylon yarn, being drawn between the first feed rollers 2 and the second feed rollers 3 in the out-drawing type machine illustrated in Figure 4, are higher than room temperature, and therefore it is recognized that these yarns are self heating. This is supported by the fact that at the location I, the undrawn yarn of a higher drawing rate is higher in temperature than the partially drawn yarn of a lower drawing rate. As the temperature of the feed rollers 3 is substantially equal to room temperature, it is inferred that the nylon yarns are cooled during passage thereof through the feed rollers 3. When the temperature of a nylon yarns (Free) not twisted after its passage through the feed rollers 3 is compared with that of a nylon yarn (Twist) twisted after its passage through the feed rollers 3, the latter is higher than the former in any of the undrawn yarns, the partially drawn yarns and the fully drawn yarns. In particular, in case of the partially drawn nylon yarn B (P.D.Y., out-drawn), it is seen that the temperature of the yarn is raised to a much higher value after its passage through the delivery rollers 3 than before. From these facts, it is inferred that a nylon yarn generates heat due to friction between filaments of the yarn caused by twisting thereof. Also, from the fact that the temperature of the yarn is low at the location III than at the location II, it is understood that the generation of heat takes place immediately after passage of the yarn through the delivery rollers 3, and thereafter the yarn thus heated is cooled as it proceeds to the winding means. Further, at the location II, the partially out-drawn yarn B is lower in temperature than the partially in-drawn yarn C, which is considered due to the fact that with the in-drawing type false twisting machine, the yarn will presumably be drawn within the heater of high temperature disposed downstream of the location II, and hence the partially in-drawn yarn C is free from the influence of self-heating due to drawing thereof.

According to the above results, it will be understood that it is most effective to heat a nylon yarn, self-heated to a high temperature due to drawing and/or twisting thereof, by means of a heater before it has been sufficiently cooled.

As described in the foregoing, according to the present invention, in the false twisting process of an undrawn nylon yarn or a partially drawn nylon yarn, the length of a heater can be reduced below 1,000 mm, and particularly below 800 mm if it is greater than 300 mm even when the feeding speed of the yarn is over 500 m/min. This provides a remarkable advantage from the viewpoint of minimization in size of a false twisting system. In particular, in false twisting of a nylon yarn of small denier, the transmission of a twisting movement is reduced if the yarn is bent at a location between the heater and the false twisting means. To avoid this, it is desired to arrange the heater and the false twisting means on a straight line, and hence conventional false twisting machines generally have relatively large heights. In the present invention, however, it becomes possible to produce a new false twisting machine which has a relatively low height, i.e. within the reach of a worker standing on the floor, and in which the heater and the false twisting means can be disposed on a straight manner.

Claims

1. A false twisting machine including feed rollers (3), a heater (4) and a false twisting means (5) which are disposed sequentially in the advancing direction of a yarn substantially on a straight line, the length of said heater (4) being greater than 300 mm but less than 1000 mm, characterized in that the distance between the feed rollers (3) and the upstream end of said heater (4) is less than 300 mm and that the feeding speed of the yarn is greater than 500 m/min.

2. A false twisting machine as set forth in claim 1, characterized in that an undrawn nylon yarn of less than 50 denier or a partially drawn nylon yarn of less than 50 denier is subjected to a false twisting treatment.

3. A false twisting machine as set forth in claim 1, characterized in that the length of said heater (4) is greater than 300 mm but less than 800 mm.

4. A false twisting machine as set forth in claim 1, characterized in that the distance between said feed rollers (3) and the upstream end of said heater (4) is less than 200 mm.

5. A false twisting machine as set forth in one of the preceding claims, characterized in that upstream said feed rollers (3) having a distance of less than 300 mm to the upstream end of said heater (4) further feed rollers (2) are provided.

6. A false twisting method for false twisting an undrawn yarn or a partially drawn yarn comprising the steps of:

disposing feed rollers (3), a heater (4) and a false twisting means (5) sequentially in the advancing direction of said yarn substantially on a straight line,

setting the length of said heater greater than 300 mm but less than 1000 mm,

characterized by the further steps of taking a nylon yarn of less than 50 denier and setting the feeding speed greater than 500 m/min,

and setting the distance between said feed rollers (3) and the upstream end of said heater (4) less than 300 mm.

7. A false twisting method for false twisting an undrawn yarn or a partially drawn yarn comprising the steps of:

- Disposing first feed rollers (3), a heater (4) and a false twisting means (5) sequentially in the advancing direction of said yarn substantially on a straight line,
- setting the length of said heater (4) greater than 300 mm but less than 1000 mm,
- characterized by further steps of taking a nylon yarn of less than 50 denier,
- setting the feeding speed greater than 500 m/min,
- setting the distance between said first feed rollers (3) and the upstream end of said heater (4) less than 300 mm,
- disposing second feed rollers (2) upstream said first feed rollers (3) and drawing said yarn between said first feed rollers (3) and said second feed rollers (2).

Patentansprüche

1. Falsch-Draht-Zwirnmaschine mit Zuführwalzen (3), einer Heizeinrichtung (4) und einer Falsch-Draht-Zwirn-Einrichtung (5), die in der Vorlaufrichtung eines Fadens im wesentlichen in einer geraden Linie aufeinanderfolgend angeordnet sind, wobei die Länge der Heizeinrichtung (4) mehr als 300 mm und weniger als 1000 mm beträgt, dadurch gekennzeichnet, daß der Abstand zwischen den Zuführwalzen (3) und dem stromaufwärts liegenden Ende der Heizeinrichtung (4) weniger als 300 mm beträgt und daß die Zuführgeschwindigkeit des Fadens größer als 500 m/min ist.
2. Falsch-Draht-Zwirnmaschine nach Anspruch 1, dadurch gekennzeichnet, daß ein unverstreckter Nylonfaden von weniger als 50 Denier oder ein teilweise verstreckter Nylonfaden von weniger als 50 Denier einer Falsch-Draht-Zwirn-Bearbeitung unterzogen wird.
3. Falsch-Draht-Zwirnmaschine nach Anspruch 1, dadurch gekennzeichnet, daß die Länge der Heizeinrichtung (4) mehr als 300 mm, aber weniger als 800 mm beträgt.
4. Falsch-Draht-Zwirnmaschine nach Anspruch 1, dadurch gekennzeichnet, daß der Abstand zwischen den Zuführwalzen (3) und dem stromaufwärts liegenden Ende der Heizeinrichtung (4) weniger als 200 mm beträgt.
5. Falsch-Draht-Zwirnmaschine nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß stromaufwärts von den Zuführwalzen (3), mit einem Abstand von weniger als 300 mm zu dem stromaufwärts liegenden Ende der Heizeinrichtung (4), weitere Zuführwalzen (2) vorgesehen sind.
6. Falsch-Draht-Zwirn-Verfahren zum Falsch-Draht-Zwirnen eines unverstreckten Fadens oder eines zum Teil verstreckten Fadens mit den Schritten:
Aufeinanderfolgendes Anordnen von Zuführwalzen (3), einer Heizeinrichtung (4) und einer Falsch-Draht-Zwirn-Einrichtung (5) in Vorlaufrichtung des Fadens, im wesentlichen auf einer geraden Linie,
Einstellen der Länge der Heizeinrichtung auf mehr als 300 mm, aber weniger als 1000 mm,
gekennzeichnet durch die weiteren Schritte, einen Nylonfaden von weniger als 50 Denier zu nehmen und die Zuführgeschwindigkeit auf mehr als 500 m/min einzustellen, und den Abstand zwischen den Zuführwalzen (3) und dem stromaufwärts liegenden Ende der Heizeinrichtung (4) auf weniger als 300 mm einzustellen.
7. Falsch-Draht-Zwirn-Verfahren zum Falsch-Draht-Zwirnen eines unverstreckten Fadens oder eines zum Teil verstreckten Fadens mit den Schritten:
Aufeinanderfolgendes Anordnen von ersten Zuführwalzen (3), einer Heizeinrichtung (4) und einer Falsch-Draht-Zwirn-Einrichtung (5) in Vorlaufrichtung des Fadens, im wesentlichen auf einer geraden Linie,
Einstellen der Länge der Heizeinrichtung (4) auf mehr als 300 mm, aber weniger als 1000 mm,
gekennzeichnet durch die weiteren Schritte, einen Nylonfaden von weniger als 50 Denier zu nehmen, die Zuführgeschwindigkeit auf mehr als 500 m/min einzustellen, den Abstand zwischen den ersten Zuführwalzen (3) und dem stromaufwärts liegenden Ende der Heizeinrichtung (4) auf weniger als 300 mm einzustellen, zweite Zuführwalzen (2) stromaufwärts der ersten Zuführwalzen (3) anzuordnen und den Faden zwischen den ersten Zuführwalzen (3) und den zweiten Zuführwalzen (2) zu verstrecken.

Revendications

1. Machine de fausse torsion comportant des rouleaux d'alimentation (3), un dispositif de chauffage (4) et des moyens de fausse torsion (5) qui sont disposés séquentiellement dans la direction d'avance d'un fil sensiblement sur une ligne droite, la longueur du dit dispositif de chauffage (4) étant supérieure à 300 mm mais inférieure à 1000 mm, caractérisée en ce que la distance entre les rouleaux d'alimentation (3) et l'extrémité amont du dit dispositif de chauffage (4) est inférieure à 300 mm et en ce que la vitesse d'avance du fil est supérieure à 500 m/min.
2. Machine de fausse torsion selon la revendication 1, caractérisée en ce que un fil de nylon non étiré de moins de 50 denier ou un fil de nylon partiellement étiré de moins de 50 denier est soumis à un traitement de fausse torsion.
3. Machine de fausse torsion selon la revendication 1, caractérisée en ce que la longueur du dit dispositif de chauffage (4) est supérieure à 300 mm mais inférieure à 800 mm.

EP 0 281 657 B1

4. Machine de fausse torsion selon la revendication 1, caractérisée en ce que la distance entre les dits rouleaux d'alimentation (3) et l'extrémité amont du dit dispositif de chauffage (4) est inférieure à 200 mm.

5. Machine de fausse torsion selon l'une quelconque des revendications précédentes, caractérisée en ce que d'autres rouleaux d'alimentation (2) sont prévus en amont des dits rouleaux d'alimentation (3) situés à une distance inférieure à 300 mm de l'extrémité amont du dit dispositif de chauffage (4).

6. Procédé de fausse torsion pour la fausse torsion d'un fil non étiré ou d'un fil partiellement étiré comportant les étapes de:

disposition des rouleaux d'alimentation (3), d'un dispositif de chauffage (4) et de moyens de fausse torsion (5) séquentiellement dans la direction d'avance du dit fil sensiblement sur une ligne droite,

10 réglage de la longueur du dit dispositif de chauffage (4) à plus de 300 mm mais moins de 1000 mm, caractérisé par les étapes supplémentaires de prise d'un fil de nylon de moins de 50 denier et réglage de la vitesse d'avance à plus de 500 m/min,

et réglage de la distance entre les dits rouleaux d'alimentation (3) et l'extrémité amont du dit dispositif de chauffage (4) à moins de 300 mm.

15 7. Procédé de fausse torsion pour la fausse torsion d'un fil non étiré ou d'un fil partiellement étiré comportant les étapes de:

disposition de premiers rouleaux d'alimentation (3), d'un dispositif de chauffage (4) et de moyens de fausse torsion (5) séquentiellement dans la direction d'avance du dit fil sensiblement sur une ligne droite,

20 réglage de la longueur du dit dispositif de chauffage (4) à plus de 300 mm mais moins de 1000 mm, caractérisé par les étapes supplémentaires de prise d'un fil de nylon de moins de 50 denier, réglage de la vitesse d'avance à plus de 500 m/min,

réglage de la distance entre les dits premiers rouleaux d'alimentation (3) et l'extrémité amont du dit dispositif de chauffage (4) à moins de 300 mm,

25 disposition de seconds rouleaux d'alimentation (2) en amont des dits premiers rouleaux d'alimentation (3) et étirage du fil entre les dits premiers rouleaux d'alimentation (3) et les dits seconds rouleaux d'alimentation (2).

30

35

40

45

50

55

60

65

FIG. 1

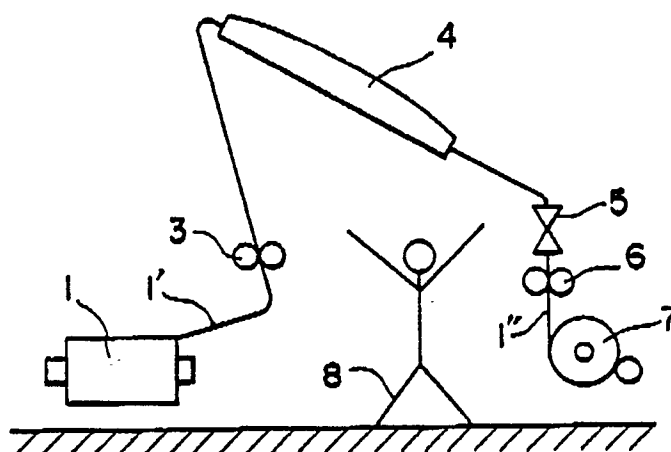


FIG. 2

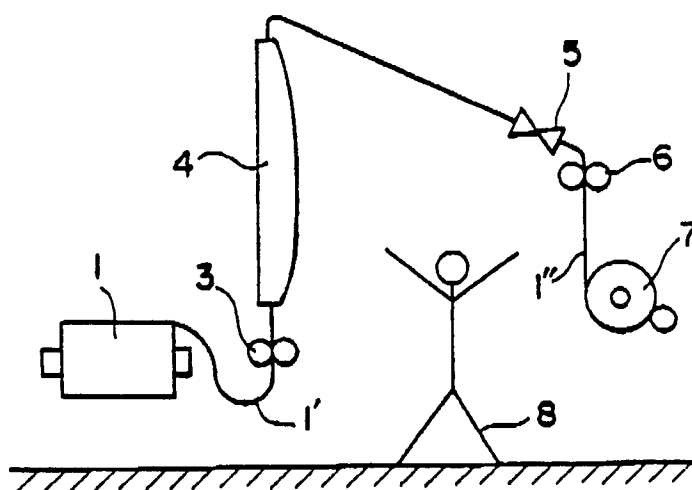


FIG. 3

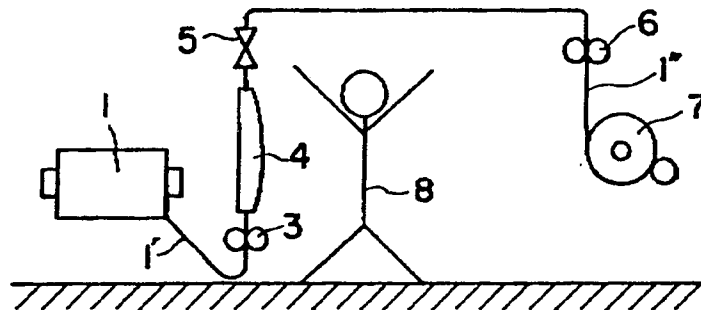
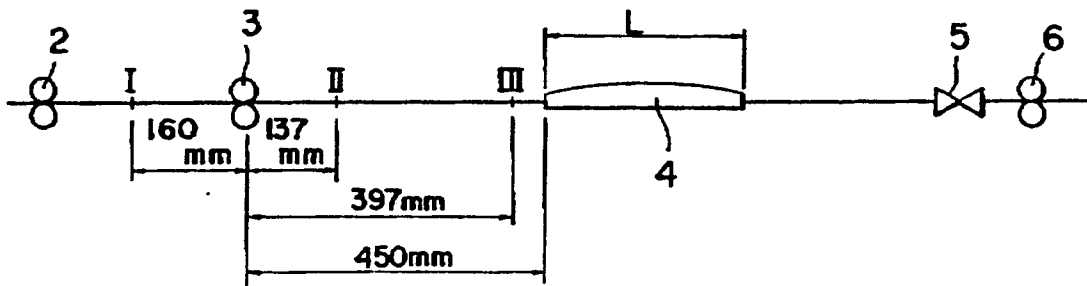


FIG. 9



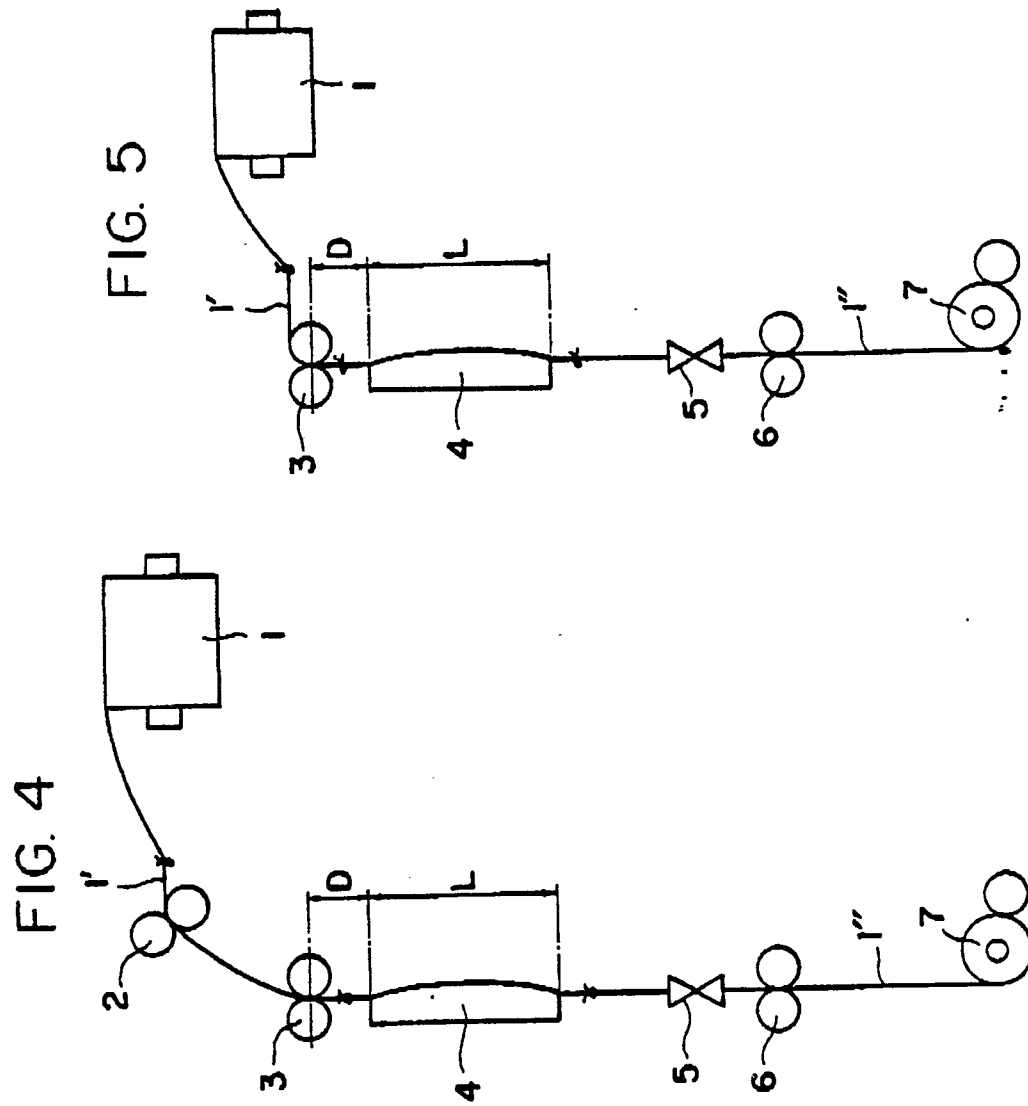


FIG. 6

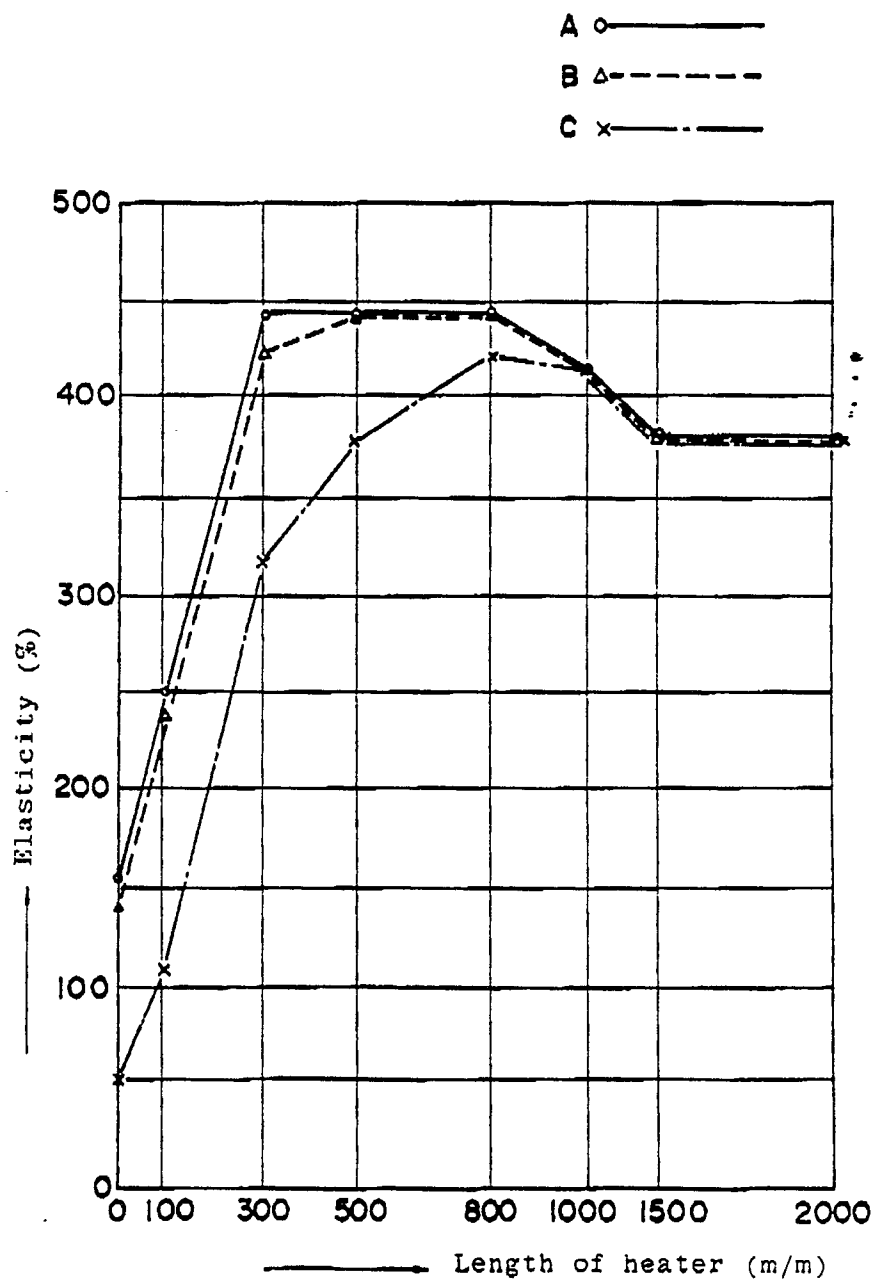


FIG. 7

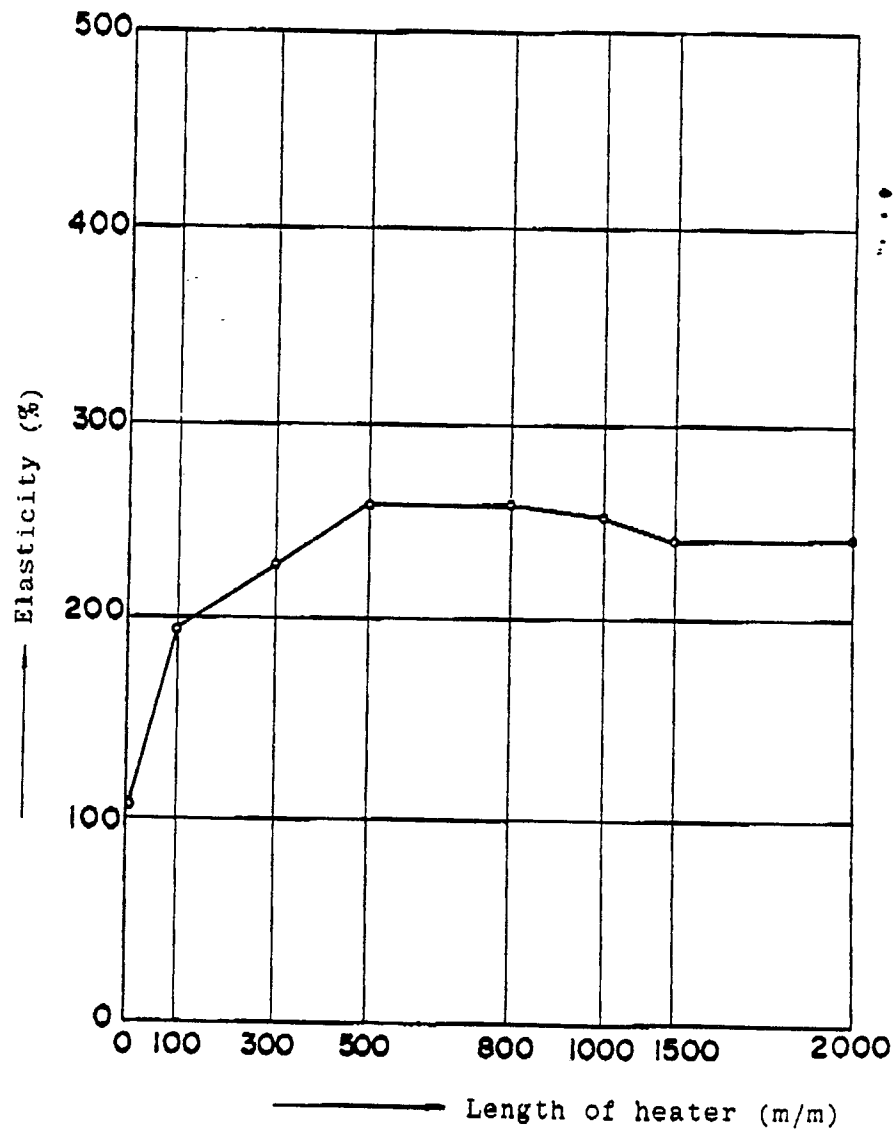


FIG. 8

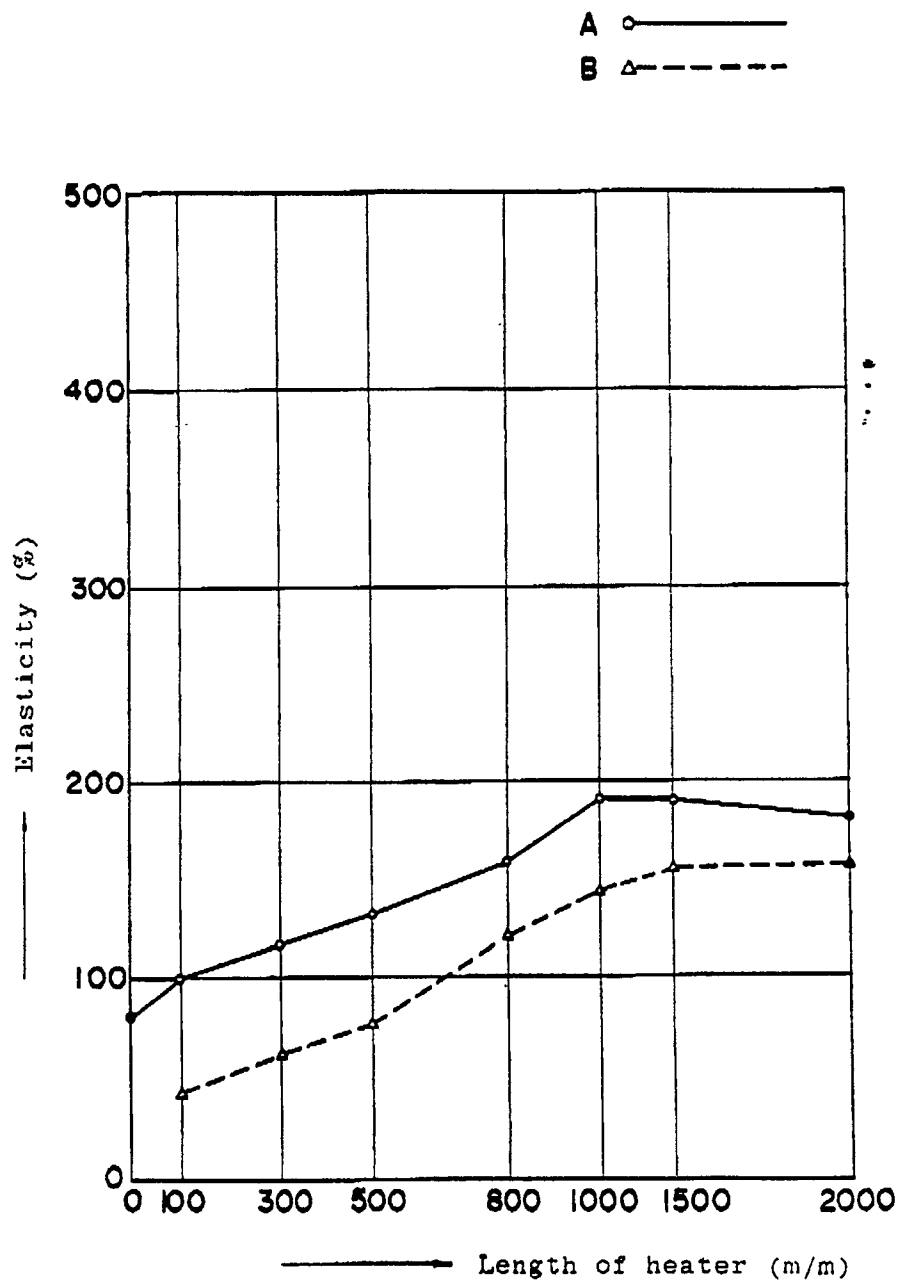


FIG. 10

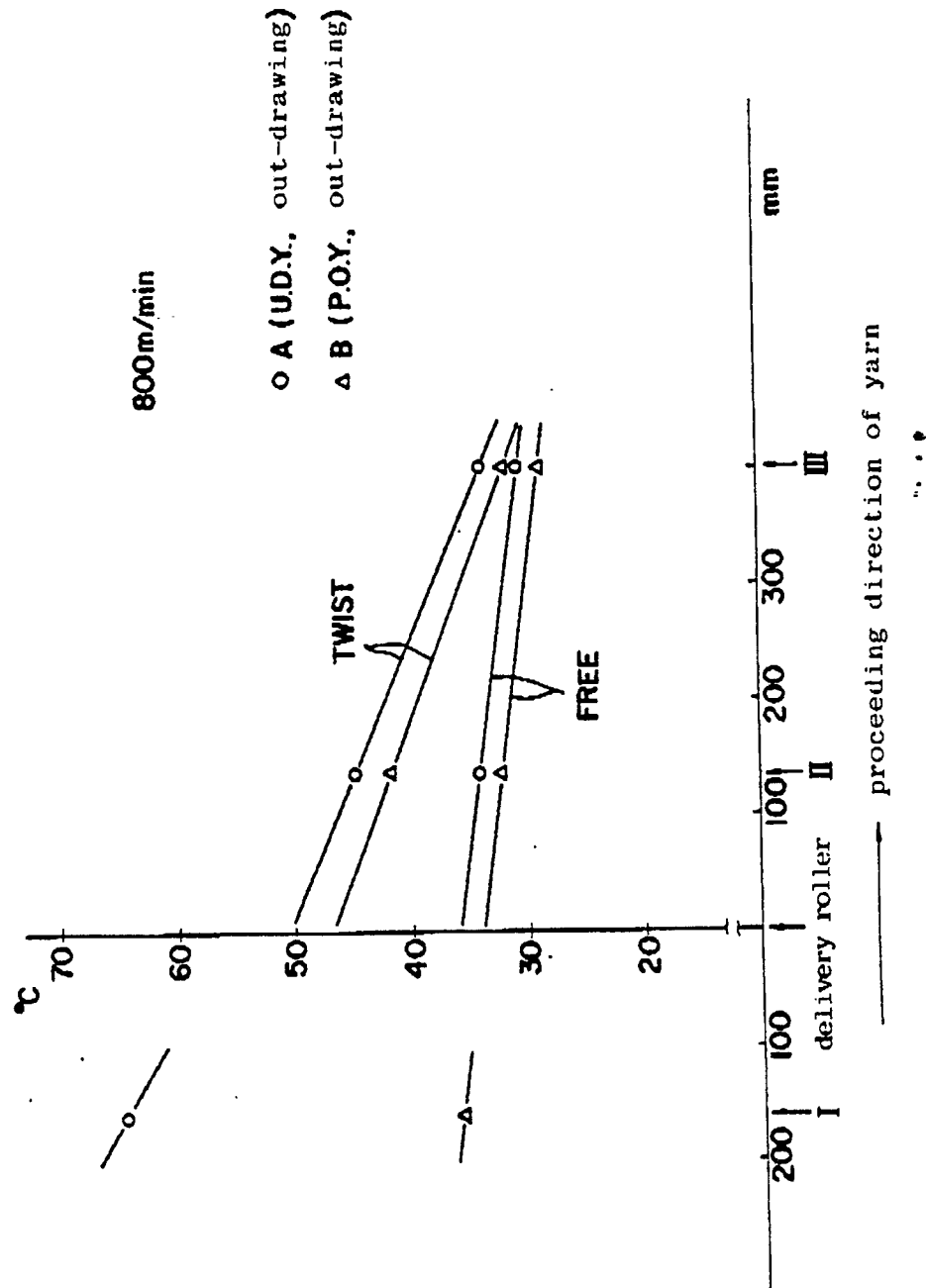


FIG. 11

