

[54] **GODET FOR YARN TRANSPORT AND STRETCHING APPARATUS**
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[51] Int. Cl.B65h 17/20
[58] Field of Search.....18/8 C, 8 SS; 226/190, 193; 29/132, 121 R, 121 A, 121 H, 125; 242/157

[56] **References Cited**
UNITED STATES PATENTS
2,690,119 9/1954 Black.....29/121 H X
3,123,891 3/1964 Brignac.....29/121 R X
3,422,491 1/1969 Kihara.....29/121 R X
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[57] **ABSTRACT**
A rotatable godet in apparatus for stretching and transporting yarn, thread or similar filamentary materials, said godet having a cylindrical yarn contacting surface in which relatively large matte-chromed or roughened surface portions are separated by two diametrically opposed and relatively narrow glossy-chromed surface bands extending longitudinally or helically along the godet circumference.

5 Claims, 7 Drawing Figures

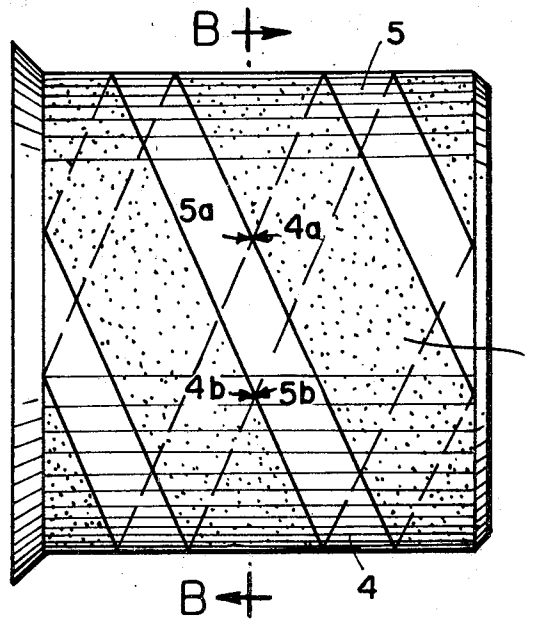


FIG. 1

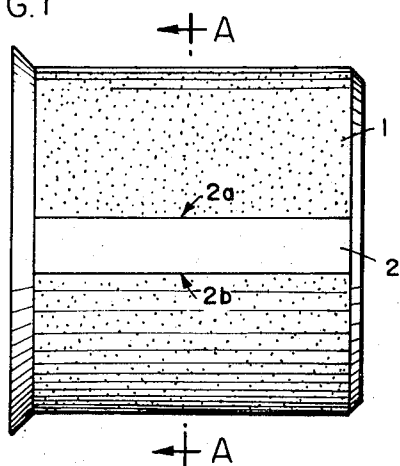


FIG. 2

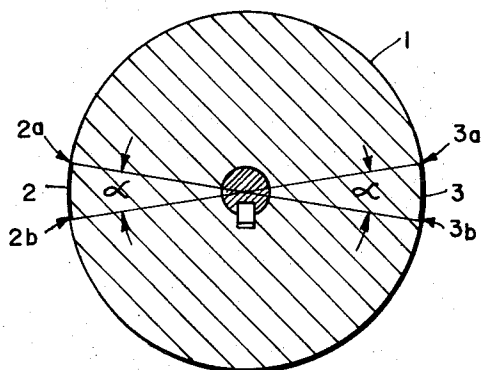


FIG. 3

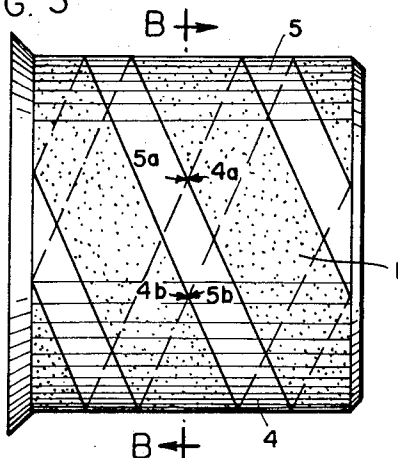


FIG. 4

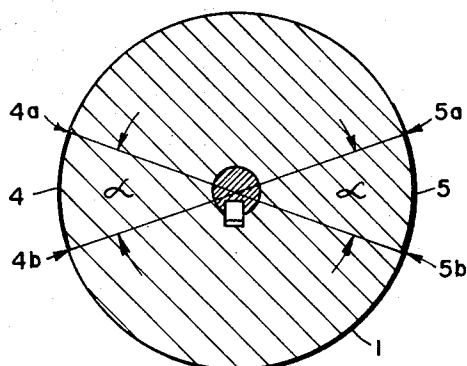


FIG. 5

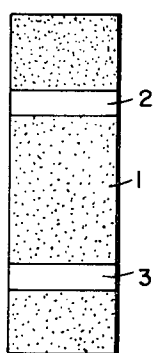


FIG. 6

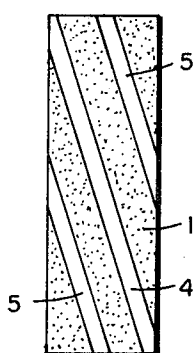
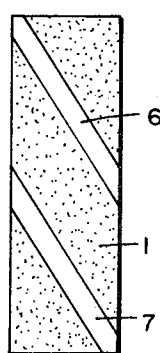


FIG. 7



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GODET FOR YARN TRANSPORT AND STRETCHING APPARATUS

This invention is generally concerned with the use of godets in stretching and conveying apparatus commonly required for handling synthetic yarns, threads, filamentary tow or the like in various textile operations. In particular, a godet is a cylindrical roller or drum which can be rotatably driven on its axis and which is especially useful in stretching or texturizing devices. The yarn or thread is normally conveyed or transported on the godet while being wrapped several times around its yarn contacting surface, often in conjunction with other rollers so that the yarn or thread can be stretched under predetermined conditions. The general arrangement of feed rolls, draw rolls and other apparatus in combination with one or more godets is very well known in the production of synthetic filamentary materials, and the present invention is primarily concerned only with the surface structure of the godet itself.

For reasons of mechanical strength and stability, godets are usually made of metals or metal alloys such as aluminum, copper, brass or steel. In many instances, such godets are heated in order to facilitate or properly carry out the stretching or texturizing treatment of the filaments.

Godets have become known in which the yarn contacting or running surface has been glossy-chromed. With these extremely smooth-surfaced godets, the adhesion of the yarn or thread on the running surface of the godet is relatively great, and this adhesion does have an advantageous effect during stretching because it reduces the amount of slippage of the yarn or thread on the cylindrical surface of the godet. On the other hand, such smooth-surfaced godets also cause a substantial increase in the frequency of filament breakage and the formation of so-called "winders". Filamentary winders arise because the individual filaments adhere so tightly on the godet that they break and then wind on the godet separately from the remaining filaments of the yarn or thread. These winders do not remain on the godet, but after a certain period of time, the filamentary winders are carried off the godet by the continuous yarn, thread or tow without any further thread or yarn breakage occurring. These filamentary winders impair the quality of the yarn to a considerable extent. In subsequent processing of the thread or yarn and during various textile operations, these winders become quite noticeable and troublesome because they become wound up in various mechanisms such as thread guides, thread brakes, the needles of knitting machines or also on the reed of a loom. It is therefore a common practice to employ so-called floss or snarl-watchers along the path of the yarn or thread just before these textile operations in order to provide some indication that such filamentary winders are present. Each individual winder must then be removed from the thread or yarn after which it can be retied in order to continue the textile operation, such removal of winders requiring a considerable expenditure of time and loss of production capacity.

The frequency at which these filamentary winders occur can be substantially reduced if the godet is provided with a so-called "matte-chromed" surface. This is accomplished by sand blasting the running or yarn contacting surface of the godet to a predetermined

depth of roughness and then hard-chroming this roughened surface. The depth of roughening of such matte-chromed surfaces generally amounts to about 1.5 to 40 microns, preferably about 3 to 10 microns. The use of such godets having a matte-chromed surface has the draw-back, however, that there is a substantially increased slippage of the thread or yarn on the godet surface so that a complete stretching can be achieved only if the thread or yarn is wrapped a large number of times around the godet.

Some attempts have been made to provide godets having a predominately glossy-chromed running surface, i.e. with a depth of roughness of less than 0.5 microns, combined with a number of matte-chromed strips arranged longitudinally on the circumference of the godet and parallel to its axis of rotation. In one such godet, the glossy-chromed portion amounts to about 50 to 80 percent of the total peripheral surface serving as a guide or transporting means for the yarn or thread. At least three such matte-chromed strips are required in the yarn contacting surface parallel to the axis of the godet. It was believed that such a godet would reduce the amount of thread breakage, but it has been found that such a godet does not avoid the formation of filamentary winders.

One object of the present invention is to provide an improved godet for use in combination with conventional yarn stretching and transporting apparatus whereby the number of turns of the yarn or thread around the godet can be minimized so as to achieve a complete stretching effect while at the same time substantially avoiding the formation of any filamentary winders. Another object of the invention is to provide a specific surface structure on such godets using conventional materials and methods of forming the surface, but in such a way as to avoid the above-mentioned problems of properly stretching the thread or yarn while eliminating thread breakage and filamentary winders.

It has now been found, in accordance with the present invention, that a very substantial improvement can be achieved with a rotatable, cylindrical godet in combination with yarn stretching and transporting apparatus, if the cylindrical outer yarn contacting surface of the godet consists essentially of a matte-chromed surface interrupted around its circumference by two gloss-chromed surface bands running substantially parallel to each other with each point on the center line of one band being approximately diametrically opposed to a point on the center line of the other band, these bands having a substantially constant and equal width such that the arc formed by a plane perpendicular to the godet axis and extending from one side to the other of the same band has a radian measurement of about $\pi/10$ up to $\pi/4$. The two glossy-chromed surface bands can extend longitudinally on the godet cylindrical surface such that their center lines are parallel to the godet axis of rotation, i.e. such center lines being formed by the cylindrical surface and a plane passing through the godet axis of rotation. On the other hand, it is especially advantageous to provide two such glossy-chromed surface bands which follow a helical path around the godet circumference, this path or center line of each band generating an angle of up to about 360° over the axial length of the godet yarn contacting

surface. In either instance, the glossy-chromed portion of the godet yarn contacting surface is only about 5 to 25 percent of the total peripheral surface.

The invention is described in greater detail in conjunction with the specific or preferred embodiments thereof illustrated in the accompanying drawing in which:

FIG. 1 is a side elevational view of one godet according to the invention in which two glossy-chromed bands extend longitudinally or axially on the cylindrical yarn contacting surface;

FIG. 2 is a circular cross-sectional view taken on line A—A of FIG. 1;

FIG. 3 is a side elevational view of a preferred embodiment of the godet in which two glossy-chromed bands extend in a helical path on the cylindrical yarn contacting surface;

FIG. 4 is a circular cross-sectional view taken on line B—B of FIG. 3;

FIG. 5 is a developed view, reduced in size, of the cylindrical yarn contacting surface of the godet shown in FIGS. 1 and 2;

FIG. 6 is a developed view, reduced in size, of the cylindrical yarn contacting surface of the godet shown in FIG. 3 and FIG. 4; and

FIG. 7 is a developed view, reduced in size, of the cylindrical yarn contacting surface of still another godet in which the helical path of the two glossy-chromed strips extends only partially around the circumference of the godet over its axial length.

Conventional means are employed to rotatably mount these godets in combination with various known arrangements of stretching and transporting apparatus, the illustration of such combinations of apparatus being omitted as being unnecessary to an understanding of the critical surface structure of the godet itself.

Referring first to FIGS. 1, 2 and 5 of the drawing, the predominantly matte-chromed yarn contacting surface 1 of the cylindrical godet contains two glossy-chromed and very smooth bands or strips 2 and 3 extending axially of the godet such that their center lines are on diametrically opposite points of the godet circumference. Both bands or strips have the same width, and as shown in FIG. 2, the arc α formed by the cross-sectional plane between the sides 2a and 2b of band 2 and also between the sides 3a and 3b of the band 3 corresponds to only a small proportion of the entire circumference. The best results are achieved when using such a godet in accordance with the invention in which the arc or angle α amounts to approximately $\pi/8$. Good stretching results are obtained with this godet while also avoiding filamentary winders as can be seen from the results set forth in the table below. For purposes of comparison, this table presents the results obtained with other godets having a surface structure different from that required by the present invention even though a matte-chromed surface is combined with a glossy-chromed surface.

The comparative tests carried out in the following table can be explained briefly as follows. Godet No. 1 has a yarn contacting or running surface which is entirely glossy-chromed, i.e. using a conventional smooth surface having a depth of roughness of less than 0.5 microns. Godet No. 2 has two glossy-chromed bands or strips arranged axially and at diametrically op-

posed portions of the cylindrical yarn contacting surface as shown in FIGS. 1 and 2, but with the radian measurement of the arc α amounting to $\pi/2$. Godet No. 3 has 16 axially arranged and uniformly distributed glossy-chromed bands with a radian measurement of the arc α being $\pi/16$ for each band. Godets No. 4 and No. 5 are constructed in accordance with the invention as shown in FIGS. 1 and 2 with the axially arranged bands or strips being diametrically opposed to each other and having a radian measurement of the arc α of $\pi/4$ for godet No. 4 and $\pi/8$ for godet No. 5. Godet No. 6 likewise has two diametrically opposed and axially arranged glossy-chromed bands, but in this instance, the radian measurement of the arc α amounts to only $\pi/16$. Finally, godet No. 7 has a completely matte-chromed yarn contacting surface, i.e. without any glossy-chromed portions. In order to carry out comparative tests, a yarn composed of 26 filaments of nylon 6,6 (polyhexa-methylene adipamide) was stretched with the object of achieving a final yarn size of 100 denier. In each instance, the yarn encircled the godet only twice since it is a highly desirable feature of the invention to reduce the number of windings of the yarn around the godet. The table provides a contrast between the denier actually achieved in each instance and also the number of filamentary winders per 100 kilograms of product being processed.

TABLE

Godet No.	Yarn size (denier)	No. of filamentary winders per 100 kg.
1	100.1	4.5
2	100.2	1.9
3	100.3	2.3
4	100.6	0.0
5	100.2	0.0
6	106.6	0.0
7	153.4	0.3

This table clearly establishes that only godet No. 4 and godet No. 5 are capable of completely avoiding the occurrence of filamentary winders while at the same time substantially completely stretching the filaments to the desired extent.

Also, it will be noted that this has been accomplished with only two windings of the yarn around the godet. The most favorable result was achieved with godet No. 5 in which the arc α amounts to $\pi/8$.

Referring next to FIGS. 3, 4 and 6, an especially preferred embodiment of the godet according to the invention is one in which the two diametrically opposed glossy-chromed strips or bands 4 and 5 extend in a helical or spiral path around the circumference of the predominantly matte-chromed yarn contacting surface 1. In this instance, it will be noted that each point on the center line of one band is always diametrically opposed to a point on the center line of the other band. On any cross-section perpendicular to the axis of rotation of the godet, the arc α between the sides 4a and 4b of one band 4 will always be diametrically opposed to the arc α between the sides 5a and 5b of the other band 5. Again, the radian measurement of this arc should fall between about $\pi/10$ up to a maximum of about $\pi/4$. Also, it is again preferred to provide these bands in such a manner that this arc has a radian measurement

of approximately $\pi/8$. Especially good results have been achieved when each of the glossy-chromed bands follows a helical path which generates in an angle of approximately 360° over the axial length of the godet yarn contacting surface. In other words, it is especially preferred to provide these helical bands in such a manner that they wind once around the godet over its axial length.

On the other hand, it is also feasible to provide glossy-chromed surface bands which follow a helical path intermediate the two extremes illustrated by FIGS. 5 and 6. Two helical glossy-chromed bands 6 and 7 which wind only half way around the godet over its axial length are illustrated by way of example in the developed view of FIG. 7.

The use of two such helical glossy-chromed bands, which otherwise meet the requirements of the invention, has proven to be especially advantageous in reducing the amount of straying or shifting of the yarn or individual filaments along the godet yarn contacting surface during the stretching and transporting operation. Godets constructed in this manner therefore yield a very uniform product which is stretched to the maximum desired extent and which likewise avoids filamentary winders.

For purposes of the present invention, it is generally desired to employ conventional glossy-chromed surfaces for the individual bands, i.e. surfaces with a depth of roughness of less than 0.5 microns, and it is likewise preferable to employ conventional matte-chromed surfaces for the remainder of the godet, i.e. surfaces with a depth of roughness of approximately 3 to 10 microns. Well known methods can be used for preparing the yarn contacting surfaces of the individual godets, and the terms "matte-chromed" and "glossy-chromed" are employed herein with their conventional meaning in this art. In general, it is preferable to first provide the entire peripheral yarn contacting surface with a high polish or super finish, using any of the conventional metals employed for the construction of godets. The exact location of the bands can then be covered while the remaining portion of the godet surface is sand blasted to achieve a roughened surface of the desired depth. After uncovering the strips or bands which remain with a very smooth surface, the godet can then be hard-chromed to provide a very wear-resistant surface in which the roughened portions are interrupted or separated by the two individual smooth-surfaced

bands. Other equivalent constructions in terms of materials and wear-resistant surface layers can be employed without departing from the spirit and scope of the present invention.

When operating with godets constructed in accordance with the invention, very large production runs can be obtained with practically no occurrence of filamentary winders and a very efficient stretching of the individual filaments of the yarn or thread. The godets of the invention are also quite useful when it is necessary to heat or texturize the yarn or thread in the course of textile operations.

The invention is hereby claimed as follows:

1. In a yarn stretching and transporting apparatus, the improvement which comprises a rotatable godet having a substantially cylindrical outer yarn contacting surface consisting essentially of a matte-chromed surface interrupted around its circumference by two glossy-chromed surface bands running substantially parallel to each other with each point on the center line of one band being approximately diametrically opposed to a point on the center line of the other band, each of said bands following a helical path which generates an angle of up to about 360° over the axial length of the godet yarn contacting surface and said bands having a substantially constant and equal width such that the arc formed by a plane perpendicular to the godet axis and extending from one side to the other of the same band has a radian measurement of about $\pi/10$ up to $\pi/4$.
2. An apparatus as claimed in claim 1 wherein the depth of roughness of the matte-chromed surface is approximately 3 to 10 microns and the depth of roughness of the glossy-chromed surface is less than 0.5 microns.
3. An apparatus as claimed in claim 1 wherein each of said glossy-chromed surface bands follows a helical path which generates an angle of approximately 360° over the axial length of the godet yarn contacting surface.
4. An apparatus as claimed in claim 3 wherein said arc between the two sides of each band as formed by a plane perpendicular to the godet axis has a radian measurement of approximately $\pi/8$.
5. An apparatus as claimed in claim 1 wherein said arc between the two sides of each band as formed by a plane perpendicular to the godet axis has a radian measurement of approximately $\pi/8$.

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