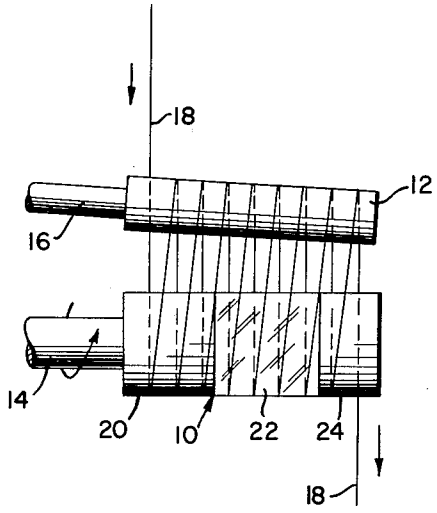
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DRAW ROLL

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DRAW ROLL

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This invention relates generally to the production of filamentary structures such as yarn or thread. More particularly, it has to do with the apparatus which is used in advancing such filamentary structures through a process.

In many processes, it is customary to advance the filamentary structure from step to step by means of rolls. For example, where the structure is being drawn, two rolls are employed and have their axes skewed so that a plurality of wraps will remain separated on the roll surfaces. The filamentary structure may be either a monofilament, a multifilament yarn or thread, a yarn bundle, or the like. Both rolls may be driven in synchronism or one roll may be driven and the other an idler. In these processes, individual filaments frequently pull out of the structure and wrap on one of the rolls. These filament back-wraps degrade the processed yarn and may even build up to such an extent as to completely break down the threadline. In a conventional drawing process, draw roll wraps are one of the major causes of equipment out time.

It is known that the number of process interruptions due to filament wraps may be reduced by providing a low friction finish on the rolls. However, with the use of such a finish, it is required that more wraps or turns of the yarn about the roll assembly be taken than where high friction rolls are employed. Thus, a low friction finish necessitates the use of longer rolls which may result in a yarn storage time not consistent with the process or in difficulties having to do with the location of the longer rolls in existing equipment. Obviously, more time is consumed in the string-up of longer, low friction rolls since more wraps are required.

The general objective of the present invention is the provision of an assembly of rolls which, because of their special characteristics, substantially reduce the incidence of draw roll wraps and, at the same time, require no elongation of or excessive number of turns about the rolls.

The most important object of the present invention is to provide a draw roll having alternate low and high friction finishes on the surface thereof.

A further object of the invention is the provision of a draw roll having a low friction finish in those sections where there is either tangential or radial motion or any combination thereof between the yarn and the roll and a relatively high friction finish at some intermediate section of the roll.

With these and other objects in view, the draw roll assembly of the invention includes a pair of cylindrical draw rolls having their axes spaced and skewed, with either or both of the rolls having a high friction finish on an intermediate section and a comparatively low friction finish on the end sections.

Other objectives will become apparent in the following specification wherein reference is made to the accompanying drawing. The single figure is a side view of a

preferred embodiment of the draw roll assembly of the present invention.

The illustrated draw roll assembly is intended for use in an apparatus of the type disclosed in U.S. Patent No. 2,289,232 and includes a draw roll **10** as well as a separator roll **12**. Cylindrical rolls **10**, **12** are on the ends of shafts **14**, **16**, respectively, and have their axes skewed. Shaft **14** is driven whereas shaft **16** is an idler brought to speed by a filamentary yarn end **18** which passes over the rolls. The cylindrical surface of roll **10** is divided into at least three sections **20**, **22**, **24**. The surfaces of roll **12** and end sections **20**, **24** of roll **10** have a relatively low friction finish whereas the surface of intermediate section **22** is provided with a high friction finish. A finish of the latter type, which is suitable for use on a draw roll, is a highly polished chrome plate or "mirror finish" having a coefficient of friction relative to synthetic polyamide fibers exceeding 0.25. An elastomeric material such as rubber could also be used in fabricating the high friction surface of roll **10**. A typical low friction finish is applied by successively sand blasting and chrome plating surface sections **20**, **24**. Such a matte finish has a coefficient of friction relative to synthetic polyamide fibers in the order of 0.14.

In operation, the draw roll assembly is strung-up with a suitable hand tool such as the aspirator device disclosed by Miller in U.S. Patent No. 2,667,964. On string-up of a running high friction roll, individual filaments are often pulled from the yarn bundle at the point where the yarn is moving both tangentially and radially with respect to the roll and is accelerated by its gripping contact with the roll. The provision of a low friction finish on section **20** permits the yarn to slip during placement of the initial wraps. The yarn next passes to section **22** which has a high friction finish and thus acts to grip the yarn and maintain yarn speed at roll surface speed. Sections **20**, **22** thus coact to permit a gradual acceleration of the running yarn from the speed at which it travels through the string-up device to roll speed. Similarly, the provision of a low friction finish on section **24** prevents individual filaments of the yarn from clinging to the roll surface in the take-off area.

In the illustrated embodiment, only draw roll **10** has been described as provided with a multi-tone finish. Under some process conditions, e.g., where both rolls are driven, it is also desirable to provide both high and low friction surfaces on the roll **12**.

The features disclosed herein have special utility in any yarn process requiring "live" string-up of running rolls. The number of different zones is not limited to three and any greater number may be employed as required by specific applications. It should also be noted that the line of demarcation between the zones need not be a straight line but may be irregular. The general principle must be followed, however, by providing low frictional characteristics wherever relative movement of the yarn with respect to the roll surface either tangential or radial exists or is desired and by providing surfaces having high frictional characteristics where no such relative movement exists so as to take advantage of maximum pulling power with a minimum number of roll wraps.

I claim:

1. A draw roll assembly comprising a pair of cylindrical draw rolls having their axes spaced and skewed, one

of said rolls having a rigid inelastic high friction surface on at least one section intermediate its ends and a rigid inelastic comparatively low friction surface on the end sections thereof, said sections having substantially equal diameters.

2. The assembly of claim 1 wherein said high and low friction surfaces have mirror and matte finishes, respectively.

3. The assembly of claim 2 wherein the other of said rolls also is provided with a matte finish.

4. As an article of manufacture, a draw roll having a rigid, cylindrical surface provided with a high friction finish on an intermediate section and a comparatively low friction finish on the end sections thereof, the high friction finish having a coefficient of friction of more than 0.25 relative to synthetic fibers and the low friction finish having a coefficient of friction of about 0.14 relative to synthetic fibers.

5. The draw roll of claim 4 wherein said intermediate and end sections have mirror and matte finishes, respectively.

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