United States Patent

[11] 3,543,984

[72] Inventor **Peter W. Mansfield**
Hopewell, Virginia

[21] Appl. No. **712,425**
[22] Filed **March 12, 1968**
[45] Patented **Dec. 1, 1970**

[73] Assignee **Allied Chemical Corporation**
New York, New York
a corporation of New York

[54] **TAPERED INFEED YARN GUIDE**
7 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **226/196;** 19/288
[51] **Int. Cl.** **B65h 23/02**
[50] **Field of Search** ..... 226/196; 57/106, 108; 242/157; 19/65(T), 66(T), 150, 288

[56] **References Cited**

UNITED STATES PATENTS

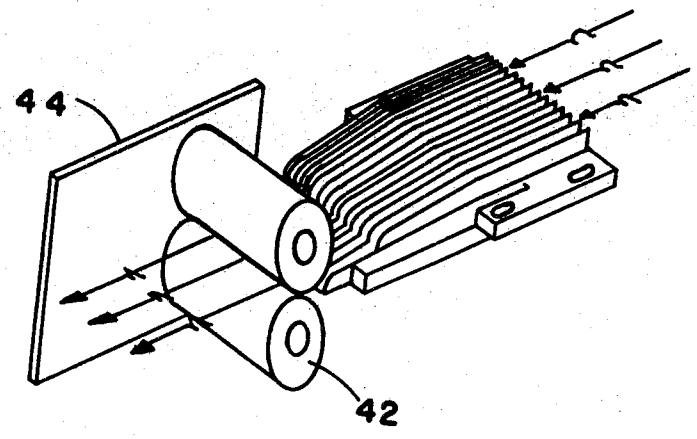
1,854,690	4/1932	Casablancas	19/150
3,216,064	11/1965	Kates	226/196X
3,277,537	10/1966	Roeder	242/157X

FOREIGN PATENTS

3,230	10/1873	Great Britain	19/150

Primary Examiner—Richard A. Schacher
Attorneys—Francis W. Guay and Roy H. Massengill

ABSTRACT: Continuous filaments supplied from yarn packages are passed through a tapered guide member having a plurality of grooves which diminish in width in the direction the filaments are advanced to converge the filaments closely together prior to their being introduced into a confined area. The sidewalls of the tapered grooves are comprised of webs made from thin metal strips mounted in a base member. The strips are removable thereby facilitating replacement or repair of worn or damaged parts.



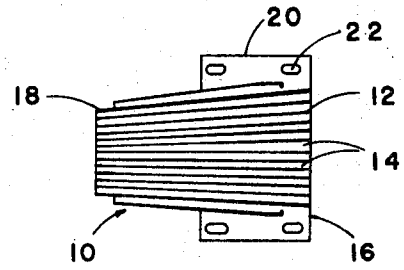


FIG. 1

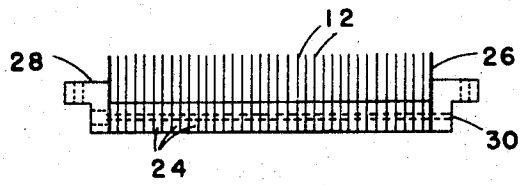


FIG. 2

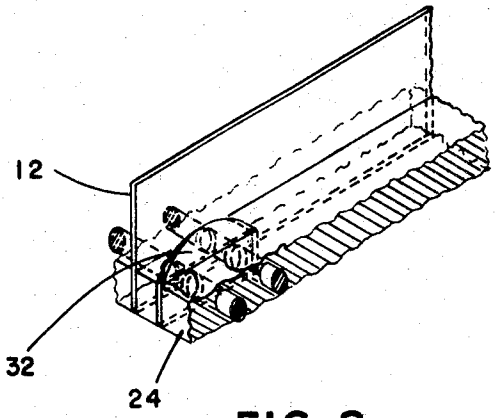


FIG. 3

INVENTOR.
PETER W. MANSFIELD
BY
Roy A. Mansfield
ATTORNEY

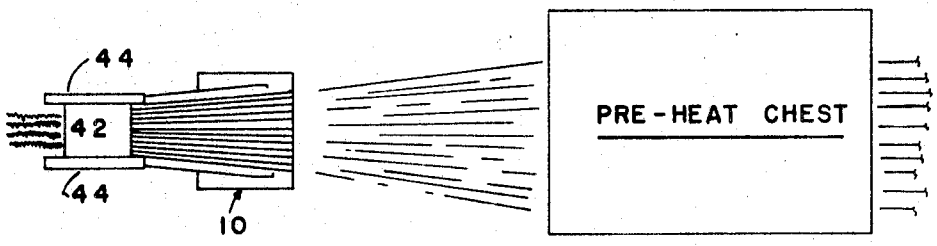


FIG. 4

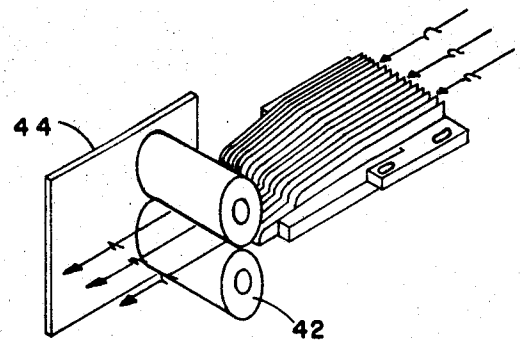


FIG. 5

INVENTOR.
PETER W. MANSFIELD

BY

ATTORNEY

TAPERED INFEED YARN GUIDE

BACKGROUND OF THE INVENTION

The present invention relates to a yarn guide member and more particularly to a tapered guide member having several tapered grooves for receiving a running yarn in each of said grooves whereby several filaments are alined side by side in close proximity and converged gradually to permit increased filament throughput. The yarn may be a single filament or a multifilament yarn but in most instances two filaments are advanced through each groove.

In the production of synthetic filaments it is essential to texture or crimp the as-spun straight filaments to impart more bulk to said filaments. This is usually accomplished by heating the filaments at temperatures above their glass transition temperature and imparting undulations to the filaments by either serrated intermeshing gears or causing the filaments to fold upon themselves in a confined area. The former method is generally referred to as gear crimping and the latter method is known as stuffer box crimping. Since the stuffer box crimping is carried out in a confined area wherein the filaments are caused to assume a folded condition, it is quite essential that the maximum number of filaments be passed through the confined area at maximum speed to achieve optimum efficiency. Therefore, the filaments must be converged to form a narrow layer at the nip rolls which overfeed the layer of filaments into the crimping chamber. There are other textile processes in which it is desirable to simultaneously guide and converge a tow of filaments while selectively keeping the filaments segregated.

Heretofore, the apparatus employed to guide filaments to the nip of feed rolls associated with a stuffer box crimper and similar equipment has consisted of grooved members having constant widths such as disclosed in U.S. Pat. No. 3,230,598 or tubular members such as disclosed in U.S. Pat. No. 2,715,309. In a normal operation the several filaments are received from a creel having the supply yarn packages spaced apart. The filaments are kept separated during preheating to obtain uniform heating thereof. Obviously the outer filaments enter the grooves of the nontapered infeed guides at an angle to the parallel grooves. Thus, the outer filaments are subjected to continuous abrasion and the problem becomes acute when the filaments have knots or other imperfections. Furthermore, the yarn defects tend to hang up in the narrow groove entrances and the guide receives excessive wear. The converging tubular guides do not separate the filaments into a discrete layer of filaments in a side by side relationship and therefore do not facilitate the maximum efficiency desired.

SUMMARY OF THE INVENTION

One embodiment contemplated by the present invention comprises a base member of laminated construction having a plurality of webs made of thin, flexible metal strips mounted in the base member to extend vertically therefrom at spaced intervals to form a plurality of grooves dimensioned to receive continuous filaments traveling at several hundred feet per minute. The individual grooves serve as guides for filaments advancing from a supply source. Normally, two filaments are passed through each groove. The thin, flexible strips are spaced substantially further apart at the end of the base member nearest the supply source to provide a wider entrance for the filaments. The spacing of the vertical strips forming the sidewalls of the filament-guiding channels or grooves is tapered gradually toward the exit end of the base member thereby gradually diminishing the width of the grooves. Preferably, the width of the grooves is at least 1.5 times greater than the exit width of each respective groove.

A less preferred embodiment of this invention is an integral unitary structure fabricated from a flat member having a tapered width by machine-cutting the grooves to the desired width. Preferably the yarn guides are made from a metal such as mild steel; however, plastic or ceramic materials may be employed if desired. It is essential that a material having excellent strength and wear properties be used since the sidewalls of the grooves or yarn separators must be extremely thin, particularly at the exit end to insure that the filaments are in as close proximity as possible. This is necessitated by the fact that most stuffer box crimpers are not more than 2 inches in width.

Worn or damaged parts of the guide members having groove sidewalls integral with the base member normally necessitates scrapping the entire member. Therefore, it is preferable to construct the guide member from a base member fabricated to receive and accommodate thin strips of metal or the like which are mounted upright in the base extending vertically therefrom to provide sidewalls for the grooves. Preferably, the base member is a laminated construction composed of members having tapered widths that function as spacers for the vertically extending strips. The assembled parts are bolted together to retain the thin strips in place. This type of construction will permit removal of the vertical strips to facilitate replacement or repair.

From a production standpoint, it is desirable to run two filaments through each slot. Quite frequently these filaments become entwined together prior to crimping and are difficult to separate when crimped in this condition. Therefore, it is desirable to insure that the filaments are separated prior to entering the crimping zone. Separation of the filaments is accomplished by employing an arcuate-shaped disk centered in the entrance of each groove. In the event the filaments are knotted together they will override the separator.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of the tapered yarn guide member of the present invention which illustrates the diminishing width between the vertical webs forming the yarn grooves and the side plates employed for mounting the guide member.

FIG. 2 2 is a front end view of a guide member illustrating the construction of a preferred embodiment of the invention.

FIG. 3 is a fragmentary view of the tapered yarn guide of FIG. 2 showing, in perspective, a modification of said guide which illustrates a curved surface mounted in the front of each groove for separating the filaments.

FIG. 4 is a top view of the guide member of this invention as employed in a preferred arrangement wherein the guide is associated with a yarn texturing process.

FIG. 5 is a perspective view of the guide of this invention shown in conjunction with a pair of feed rolls having one side plate removed.

Referring to the drawings and particularly to FIG. 1 there is shown a tapered member **10** having a plurality of spaced apart thin elements **12** extending vertically from the base of said tapered member **10**. The elements **12** are spaced equidistant across the width of the base of member **10** to form a plurality of grooves or channels **14** having tapering widths which diminish gradually along the entire length from the entrance end **16** to the exit end **18** of said grooves. The entrance end of grooves **14** have widths at least 1.5 times the exit ends and preferably about 2 times greater. The guide member **10** is provided with side flanges **20** for mounting the said member to a base. Elongated holes **22** are provided therein for making minor adjustments of the member when associated with other equipment.

Shown in FIG. 2 is a preferred embodiment of the invention wherein the particular details of a laminated construction thereof are shown. As shown, the vertical elements **12**, which form the sidewalls of the grooves **14**, are mounted between a plurality of members which function as spacers. A side plate **26** and flange **28** are placed on each side of the laminated construction. The entire unit is bolted together by bolts, not shown, which are accommodated by the bolt holes **30**.

The members **24** which form the base of the guide member **10** are determinative of the size of the grooves. The size of the grooves is determined primarily by the total denier of yarn to be processed. For example, the denier of each filament and

the number of filaments per yarn end passing through each groove or slot influences the width and height of said grooves. The spacer bars **24** preferably are cut from mild steel stock although a hard plastic or ceramic material may be employed. In a specific example, the spacers are about 6 inches long and have a width of about 0.075 inch at one end which tapers down to about 0.045 inch at the other end. The depth is about 0.50 inch but obviously must be thinner at the exit end if used in conjunction with a pair of nip rolls. The webs **12** are about 0.01 inch thick and may be cut from shim stock material. Preferably, these elements are case hardened and polished to prevent excessive wear.

FIG. **3** represents a modification of the guide member **10** shown in FIGS. **1** and **2**. In yarn processing operations such as stuffer box crimping it is desirable to run two filaments through each yarn groove to increase productivity. Once the yarn has been crimped the filaments are again separated prior to takeup. If the filaments are not distinctive from each other at the time of entering the stuffer box feed rolls, they present a problem when separating them in a crimped condition. Where two ends are passed through the same yarn groove the filaments have a tendency to get entwined about each other prior to entering the nip of the rolls. These entwined filaments have an adverse effect upon crimping efficiency and are quite difficult to separate once they have been crimped.

Heretofore, separation means such as a leasing bar has been employed to separate the filaments. Difficulties have been encountered with these devices since one of the entwined filaments is frequently broken rather than separation occurring. To overcome this problem, I have provided an arcuate-shaped disk **32** which is positioned in the center of each yarn groove as shown in FIG. **3**. The curved surface permits an entangled portion in the yarn feed to override the separator **32** prior to one of the filaments being broken. Thus, if the yarn entanglement is easily removed, the filaments will be separated by disk **32**, but if a force is imposed which approaches that required to break either of the filaments, the filaments will pass over the disk. It has been found that a substantial amount of down time may be obviated when employing the separator described above.

In FIG. **4** the yarn guide of this invention is shown in conjunction with part of a typical stuffer box crimping process. The yarn enters a preheat chest **40** from a source, not shown. In the preheat chest the yarn is heated to a desired temperature. To achieve uniform heat treatment of the filaments it is essential that they be spread apart while being advanced through the preheat chest. Therefore, the filaments must be converged from a width of several inches down to a width of about 2 inches or less. The fan-shaped construction of my invention permits the yarn ends to enter the wide entrance of the grooves in substantial alinement therewith. Filaments having nodules, knots or other defects are funneled into the guide member **10** without getting caught or snagged at the entrance thereof. The filaments exit the guide in a narrow band at the nip of a pair of feed rolls **42** which overfeed the yarn into a stuffer box crimper, not shown. The feed rolls are provided with a side plate **44** at each end to prevent filaments from splaying off the rolls. Usually the guide member is press fitted between the side plates **44**.

FIG. **5** depicts the close proximity of the exit end of guide member **10** to the nip of the rolls **42**. Obviously, the exit end of the guide member has to be dimensioned to accommodate the associated equipment in a given process. When employed in combination with a pair of rolls, as shown in FIG. **5**, the guide member **10** is V-shaped to fit in the nip of the rolls.

I Claim:

1. Apparatus associated with a pair of feed rolls employed for advancing a plurality of continuous filaments, said apparatus being comprised of a tapered base member, said base member having a plurality of members extending upright therefrom and spaced equidistant to form a plurality of grooves having widths which diminish gradually toward the end of said apparatus adjacent the feed rolls, and means located in each of said grooves for separating a pair of filaments.

2. The apparatus of claim **1** in which the flexible members are removable.

3. The apparatus of claim **1** in which the width of the grooves at one end is at least 1.5 times the width of the respective grooves at the other end thereof.

4. The apparatus of claim **1** in which the flexible members have a thickness of less than 0.015 inch.

5. The apparatus of claim **1** in which the flexible members are metal.

6. The apparatus of claim **1** in which the base is a laminated structure comprised of a plurality of tapered members that separate said upright members.

7. The apparatus of claim **1** in which the means is an arcuate-shaped disk.