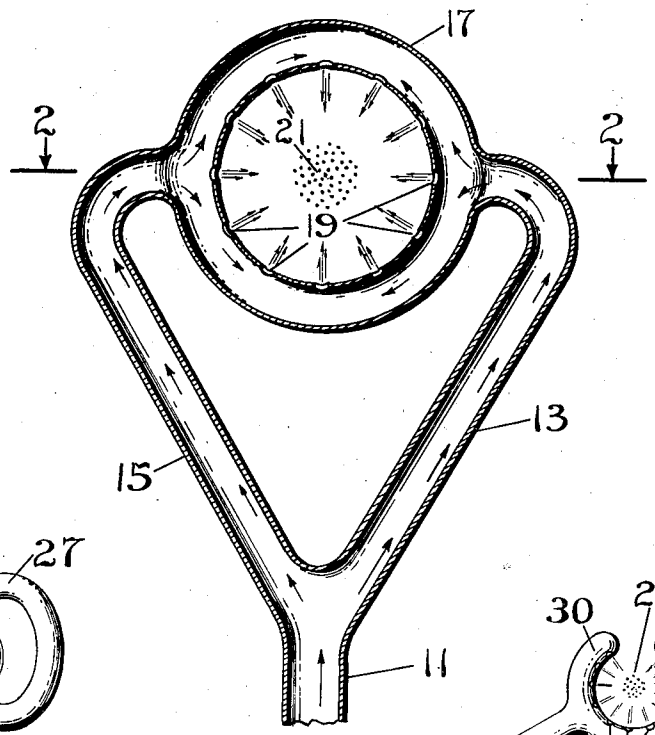
Feb. 27, 1940. V. R. HARDY ET AL 2,191,791

THREAD GUIDE

Filed Sept. 9, 1937

Fig. 1.



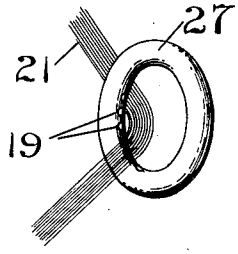


Fig. 3.

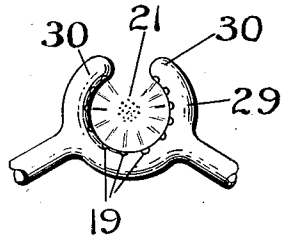
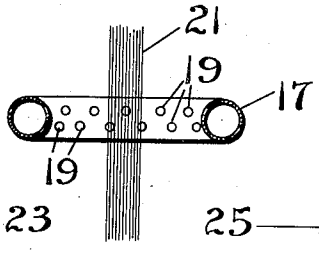


Fig. 4.



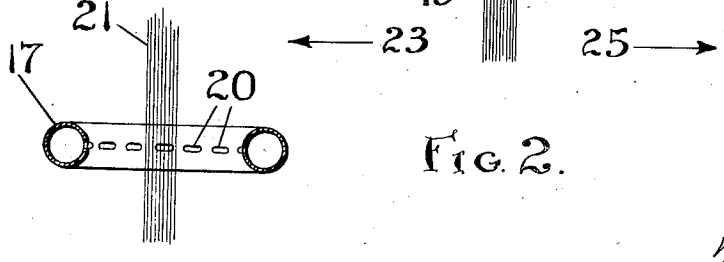


Fig. 2.

Fig. 5.

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UNITED STATES PATENT OFFICE

2,191,791

THREAD GUIDE

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Application September 9, 1937, Serial No. 163,068

6 Claims. (Cl. 242—18)

This invention relates to a thread guide. More particularly, this invention relates to a guide for directing the path of movement of very fine denier, delicate threads under very little tension while winding the same onto a bobbin, tube, core or the like. In the production of very fine denier thread, or thread having a crimped or curly structure, it has been found that considerable degradation and removal of curliness takes place as a result of guiding of the thread with a rigid thread guide due to the rubbing of the thread against the walls of the guide. This rubbing action is particularly objectionable in traversing thread guides which are used in the winding of threads on a spool or bobbin, or in stationary thread guides in which the threads take a decided change in the direction of travel.

It is therefore an object of this invention to provide a thread guide for use in the production of curly and fine denier threads and filaments which will have substantially no degrading action on the threads.

It is another object of this invention to provide a traversing thread guide which may be used to rapidly traverse the thread back and forth while being wound onto a bobbin without materially degrading the threads or filaments.

It is a still further object of this invention to provide a means for guiding a thread in which fine jets of a fluid medium are directed radially against the threads in such a manner that the thread will have little or no contact with the sidewalls of the guide even though the thread is being given a decided change in direction of travel.

The objects of the invention may be accomplished, in general, by constructing a thread guide with an element substantially surrounding the thread, and providing the internal surface of the surrounding element with a plurality of openings through which a fluid medium may be passed against the thread to prevent the contact of the thread with the internal surface of the guide.

The invention will be more clearly apparent by reference to the following detailed description taken in connection with the accompanying drawing in which:

Figure 1 is a vertical sectional view through a thread guide constructed in accordance with the invention.

Figure 2 is a sectional plan view of the guide shown in Figure 1 taken along the line 2—2.

Figure 3 is a diagrammatic perspective view showing a modified form of the invention.

Figure 4 is a side elevational view of still another form of the invention.

Figure 5 is a sectional plan view showing a guide having narrow slots as openings for passage of a fluid medium.

Referring to Figure 1 of the drawing, reference numeral 11 designates a supporting element of a thread guide which may be attached to the traversing bar of a winding machine (not shown). The supporting member 11 is divided into two branch lines 13 and 15, which branch lines are connected to opposite sides of an annular hollow member 17. The support 11, as well as branch lines 13 and 15 are also made hollow and are connected to each other in such a manner that a fluid medium may be passed therethrough into the hollow annular member 17 as shown by the arrows. The internal periphery of the hollow annular member 17 is provided with a plurality of openings 19 through which the fluid medium will be radially inwardly directed against the thread 21. The openings 19 are preferably arranged in two staggered rows as shown in Figure 2. The thread 21, as it passes through the guide annulus 17, will be forced to remain substantially in the center thereof spaced from the perforated side walls. The fluid medium will be directed against the threads in two circles of radially directed jets which will slightly diverge from the internal surface of the annulus. It will be readily apparent that the thread, therefore, is floated through the center of the annulus 17 rather than being forced by the internal side walls thereof. The arrows 23, 25 at the bottom of Figure 2 indicate that the thread annulus 17 may be reciprocated or oscillated back and forth and still maintain the positioning of the thread substantially within the center of the annulus.

Figure 3 of the drawing illustrates, diagrammatically, a stationary thread guide through which the thread 21 is passed to take a very decided change in direction of movement. Air blasts passing from a plurality of openings on the inner surface of the surrounding element 27 prevent the thread from contacting the side walls of said element.

In Figure 4 of the drawing is illustrated a modified form of thread guide, constructed in accordance with the invention, in which the hollow member 29 is not completely closed at the upper end thereof, but in which the ends 30 sufficiently surround the thread 21 so that the fluid jets will be directed against the thread from substantially all sides. In this case, it may be desirable to provide the ends 30 with more or larger fluid jet openings so as to compensate for the opening therebetween. The jets opposite the opening between members 30 may, on the other hand, be less in number or smaller in size to prevent movement of the thread upwardly from the guide.

The modification shown in Figure 5 is the same as that illustrated in Figure 2 with the exception that the openings through which the fluid medium is directed against the thread are in the

form of slots or narrow slits 20. Obviously the openings may have outlines of any desired size or shape, and if desired a single fine slot may be provided in the guide to accomplish the desired purpose.

The specific embodiment of the invention illustrated by Figure 1 of the drawing has been used successfully for traversing thread to and fro as the thread is wound up on a bobbin or spool, by mounting the guide in a vertical position and passing the thread substantially horizontally therethrough. In this case, thread of extremely low denier, in the neighborhood of 5 to 10 denier, was wound with practically no tension onto a bobbin.

The shape of the thread guide may be varied considerably to suit the specific problem. The perforations may be of various shapes or sizes and may vary in size and shape from one section of the guide to another in order to take care of special conditions. Under certain conditions, it may be desirable to provide the guide member with perforations in the form of staggered slots. The hollow guide member which surrounds the thread may be connected by one or more members to a suitable fluid source. Instead of making the guide annulus substantially round in cross section, it may be made square, triangular, rectangular, elliptical or any other suitable shape. The guide member itself need not even completely surround the thread but may be made in various shapes so long as the thread passing therethrough is acted upon by one or more fluid jets of sufficient force to keep the thread floating and substantially free from contact with the guide.

The guide may be made of any desirable material, such as, for example, glass, ceramic material, metal, metal alloy and the like and may vary in size and shape according to the size and shape of the thread, strand, or the like passing therethrough.

Although the invention is described specifically for guiding filament bundles, it can of course be used for the guiding of any filamentous material and it may be advantageously used in the guiding of fine, delicate ribbon, in which case it is desired that the guide be elliptical or rectangular in shape with the perforations suitably distributed to provide desirable fluid cushions for supporting the product.

Although a gaseous fluid medium is much to be preferred for use in the guide of the present invention, since a gaseous medium will have a certain cushioning effect, nevertheless, it is obvious, of course, that other fluid mediums can be used. As a gaseous medium, air is perhaps the most expedient and practical substance for ordinary use, although other vapors or gases such as nitrogen, carbon dioxide, steam or the like may be used equally well.

Liquid materials may be used to prevent contact of the threads with the guide in the same way as gases, and at the same time, the threads may be given a certain liquid treatment such as, for example, treatment with a regeneration liquid, purification liquid, dyeing liquids or sizing and finishing liquids.

The guide may be mounted in any suitable position, provided only that the fluid jets act substantially transversely to the direction of thread travel, the important point being that the thread is supported by the fluid jets at one or more points.

The guide of the present invention may be used for directing the course of travel of filamentous products of any kind, such as, for example, artificial silk, silk, cotton or any other kind of filaments or threads. This guide has particular merit in winding threads having a woolly crimped or curly structure. Such threads can be wound without removing the crimp or curl therefrom.

The invention has particular utility in the guiding of threads composed of synthetic linear condensation polymers of the type described in Patent No. 2,071,250 of Wallace H. Carothers, and especially such threads having a crimp or curl imparted thereto as disclosed in Hardy and Miles application, Serial No. 125,939, filed February 15, 1937.

Since it is obvious that many changes and modifications can be made in the above described details without departing from the nature and spirit of the invention, it is to be understood that the invention is not to be limited except as set forth in the appended claims.

We claim:

1. The method of traversing a thread while winding the same onto a bobbin which comprises forcing the thread backwardly and forwardly across the bobbin by means of a fluid current directed against said thread.

2. The method of traversing a thread while winding the same onto a bobbin which comprises forcing the thread backwardly and forwardly across the bobbin by means of a gaseous current directed against said thread.

3. The method of traversing a thread while winding the same onto a bobbin which comprises forcing the thread backwardly and forwardly across the bobbin by means of an air current directed against said thread.

4. A guide for directing the movement of a filamentous material comprising an element through which the thread passes, at least one opening on the internal periphery of said element, means for passing a fluid medium through said opening whereby to radially direct the same against said thread, said opening being sufficiently large and being positioned in such a manner as to continuously exert a fluid force on said thread away from said guide whereby to prevent degrading contact of the thread with said guide.

5. A guide for directing the movement of a filamentous material comprising a traversing, supporting member, an element through which the thread passes connected to said member, at least one opening on the internal periphery of said element, means for passing a fluid medium through said opening whereby to radially direct the same against said thread, said opening being sufficiently large and being positioned in such a manner as to continuously exert a fluid force on said thread away from said guide whereby to prevent degrading contact of the thread with said guide.

6. A guide for directing the movement of a filamentous material comprising a traversing, supporting member, an element through which the thread passes connected to said member, a plurality of openings positioned in staggered relationship on the internal periphery of said element, means for passing a fluid medium through said openings whereby to radially direct the same against said thread, said openings being sufficiently large and being positioned in such a manner as to continuously exert a fluid force on said thread away from said guide whereby to prevent degrading contact of the thread with said guide.

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