April 18, 1939. S. O. FIEDLER 2,154,609

ARTIFICIAL THREAD PRODUCTION

Filed Oct. 30, 1936 2 Sheets-Sheet 1

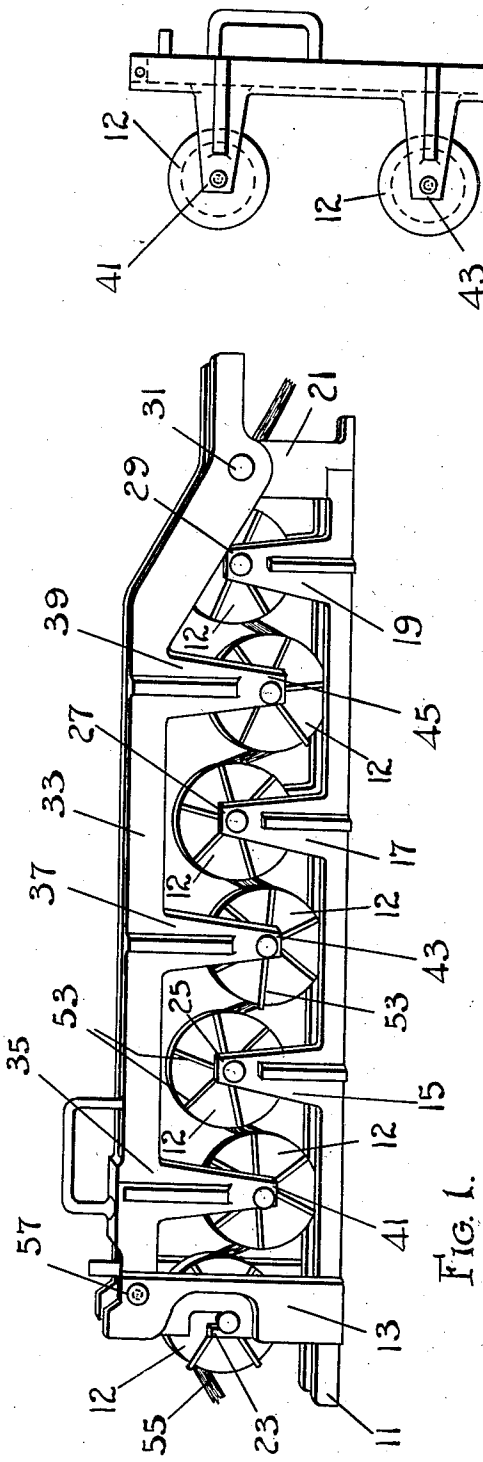


FIG. 1.

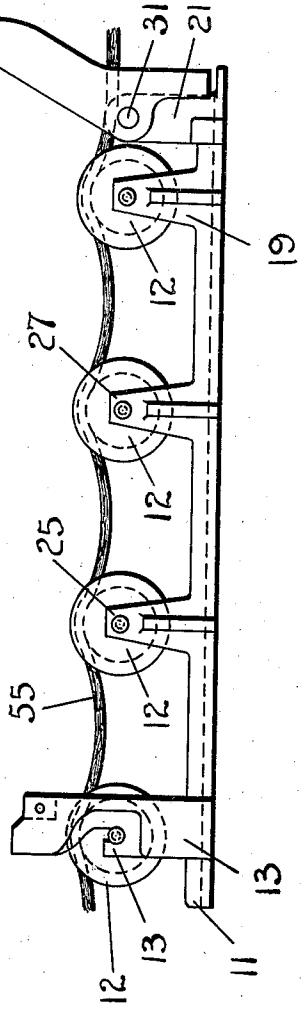


FIG. 2.

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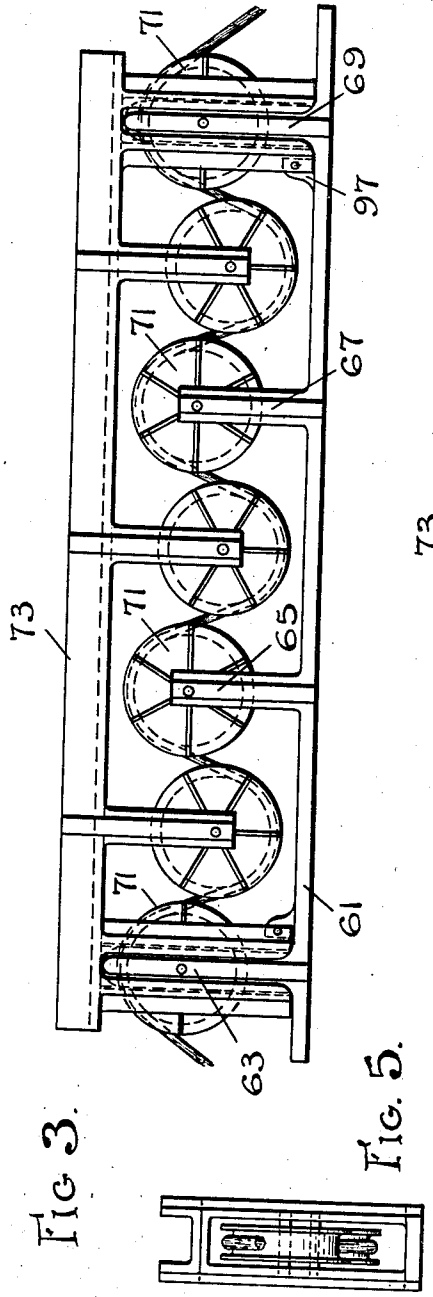


FIG. 3.

FIG. 5.

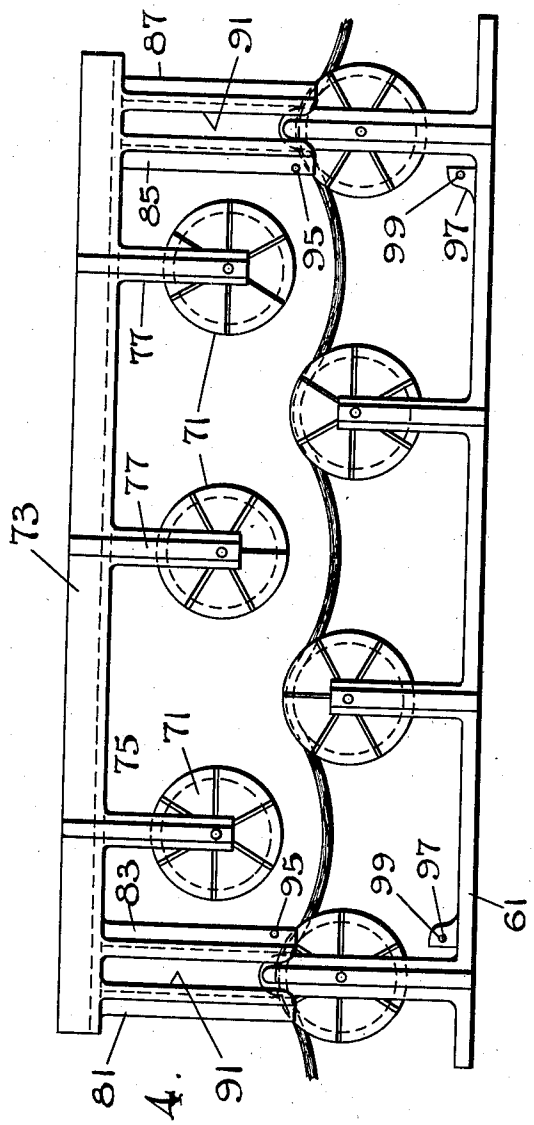


FIG. 4.

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UNITED STATES PATENT OFFICE

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ARTIFICIAL THREAD PRODUCTION

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Application October 30, 1936, Serial No. 108,354

2 Claims. (Cl. 18—8)

This invention relates to a tensioning device for use in the production of large bundles of filaments under relatively high tension. More specifically, the invention relates to a coagulating bath tensioning guide for tensioning freshly precipitated filament bundles of partially regenerated cellulose produced by the viscose process.

Numerous tensioning devices have been advocated for use in the production of improved threads, filaments, yarns or the like, and while many of these devices are satisfactory for the spinning of ordinary sized yarns or threads, none of them are suited for the tensioning of large bundles of filaments such as are found in the production of rayon staple.

In the spinning of regenerated cellulose filaments which are to be ultimately cut into short fibers or staple, it is customary to spin through a very large spinneret having, for example, 2,000 or more holes therein, so as to produce a filament bundle that is from 2,000 to 5,000 denier, or even larger, in size.

In the production of high tenacity staple rayon, a tension of the order of 2,000 to 3,000 grams must be gradually built up in the filament bundle during the period when the filaments are relatively plastic or incompletely regenerated, that is, the tension must be applied before the filament bundle has traveled very far in the coagulating bath. In order that the tensioning arrangement may be feasible and of commercial value, it is necessary that only a relatively small space be used for the coagulating bath for each filament bundle. The coagulating bath space in which the filament bundle is coagulated is usually about 3" wide and 3 or 4 feet long, and since a freshly precipitated bundle of filaments of 3,000 to 4,000 denier is quite large, being nearly an inch in diameter, and very brittle before it is stretched by the draw-off rollers, a real problem is involved.

Stationary or friction guides are entirely unsatisfactory for tensioning a very large bundle of filaments because of the very high total tension required. A plurality of positively driven rollers running at successively higher peripheral speeds to stretch and tension the filament bundle therebetween might theoretically be satisfactory, but in view of the very high total tension needed, extremely large rolls are required to prevent slippage, and furthermore, they can not be satisfactorily located close to the spinnerets where the threads have the desired plasticity. Furthermore, such rolls can not be accommodated in the small space available in the coagulating bath.

It is therefore an object of this invention to provide an improved thread tensioning guide that is capable of imposing a very large total tension on a very large filament bundle.

It is another object of this invention to provide an improved thread tensioning guide which is capable of imposing a very large total tension on a large filament bundle, and which is adapted to place the tension on the bundle at a point where the thread has the desired plasticity.

It is a further object of this invention to provide an improved thread tensioning guide which is capable of imposing a very large total tension on a large filament bundle and which may be easily threaded in the limited space available in the coagulating bath.

Other objects of the invention will appear hereinafter.

The objects and details of the invention will be more clearly apparent by reference to the following detailed description taken in connection with the accompanying illustration of two specific embodiments of the invention, and in which,

Fig. 1 is a perspective view showing one modification of a thread tensioning device in a closed position.

Fig. 2 is a side elevational view of the thread tensioning device shown in Fig. 1 in an open position.

Fig. 3 is a side elevational view of another modification of a thread tensioning device constructed in accordance with the present invention.

Fig. 4 is a side elevational view of the thread tensioning device shown in Fig. 3 in an open position.

Fig. 5 is an end elevational view of the thread tensioning device shown in Figs. 3 and 4.

Referring to Figs. 1 and 2 of the drawings, reference numeral 11 designates a stationary base support provided with a plurality of upstanding sections 13, 15, 17, 19, and 21; the first four of which are provided with journal bearings 23, 25, 27, and 29. A second support 33 is pivotally connected to the upstanding section 21 by means of a pin or the like 31 in such a manner that the support 33 may be swung about the pivot 31 to an open position as shown in Figure 2. The base support 11 is provided with a plurality of grooved thread guiding rollers 12 which are freely, rotatably mounted in the journal bearings 23, 25, 27 and 29. The second support 33 is provided with three downwardly extending members 35, 37, and 39. The downwardly extending members are provided in pairs having spaced journal bearings 41, 43, and 45, in which are positioned grooved thread guiding rollers, 12. The thread guiding

rollers which are positioned in both of the supports are substantially identical to each other, and are preferably provided with vanes 53 which will somewhat resist the rotation of said rollers when placed in a coagulating bath. That is to say, the coagulating bath will surround the vanes of the various rollers and thereby resist the ready rotation thereof to a certain extent. The grooves of the roller guides are clearly illustrated by means of the dotted lines in Figure 2.

The operation of the thread tensioning guide as shown in Figures 1 and 2 will be as follows. The support 33 will be lifted to the open position shown in Figure 2 and the bundle of filaments 55 will be laid into the grooves of the guide rollers 12 of the base support 11. The thread bundle 55 will then be placed into position on the conventional draw-off rollers (not shown) which pull the thread bundle through the coagulating bath. After the thread is being drawn from the spinneret through the coagulating bath over the lower guide rollers, the support 33 is slowly lowered into position as shown in Figure 1 of the drawings so as to gradually impose a tension on the filament bundle and is then locked into position by means of a pin 57, or the like, so as to lock the two supports into fixed position relative to each other.

Referring to Figures 3, 4, and 5 of the drawings, reference numeral 61 designates a base support, which base support is provided with a plurality of parallel upstanding pairs of members 63, 65, 67, and 69. These upstanding pairs of members are provided with journal bearings in which may be positioned grooved roller guides 71 for rotation relative thereto. A second support 73 is provided with downwardly extending pairs of members 75, 77 and 79 which also are provided with journal bearings in which may be positioned grooved roller guides 71 for free rotation relative thereto. The support 73 is furthermore provided with pairs of downwardly extending members 81, 83 and 85, 87. The pairs of members 81 and 83 are provided with a slotted arrangement 91 which will slidingly fit about the edges of the pair of members 63 of the base support 61. The pairs of members 85 and 87 are similarly provided with a slotted arrangement 91 for cooperation with the pair of members 69 of the base support. By this arrangement of the members 63 and 81 and 83, and members 69 and 85 and 87, the second support 73 may be positioned in place on the base support 61 in a definite prearranged position, with the guide rolls 71 of support 73 interpositioned between the guide rolls 71 of the base support. The members 83 and 85 are provided with openings 95 which will cooperate with the openings 99 of the lugs 97 when placed in a closed position as shown in Figure 3 of the drawings. When placed in this position, a pin or the like may be placed through the cooperating holes so as to maintain the supports 61 and 73 in a fixed position relative to each other.

The device shown in Figures 3, 4, and 5 of the drawings will be threaded and will operate in the same manner as above described with reference to Figures 1 and 2 of the drawings. The top support 73 will be entirely removed from the lower support 61 and the thread bundle 55 positioned on the lower guide rollers 71, after which the support 73 will be positioned on the support 61 with the guide rolls of the support 73 in the position between the guide rolls of the support 61 in the manner described above.

The size and shape of the roller guides and the number and size of the vanes thereon may be varied in accordance with the size of the filament bundles and in accordance with the tension desired.

While this invention has been described in connection with the spinning of very large bundles of filaments produced from viscose, it will be obvious that it is equally applicable to the production of large bundles of artificial filaments of thread produced from cuprammonium cellulose solution or lowly etherified or lowly esterified cellulosic solutions or, in fact, any solution from which artificial filaments may be produced by coagulation in a coagulating bath.

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

I claim:

1. In a coagulating bath tensioning guide for imparting a high, uniform tension to filament bundles having a denier of at least 2000, a base support, a plurality of guide rolls rotatably mounted in said base support, a second support, a plurality of guide rolls rotatably mounted in said second support, means for pivotally connecting said supports to each other in such a manner that the guide rolls of the supports may be removably interpositioned between each other, and means for locking said supports relative to each other with their respective guide rolls interpositioned.

2. In a coagulating bath tensioning guide for imparting a high, uniform tension to filament bundles having a denier of at least 2000, a base support, a plurality of grooved guide rolls rotatably mounted in said base support, a second support, a plurality of grooved guide rolls rotatably mounted in said second support, means for pivotally connecting one end of one support to one end of the other support in such a manner that the guide rolls of the supports may be removably interpositioned between each other with the grooves of all of said rolls in alignment.

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