Jan. 27, 1953 S. L. ABBOTT 2,626,431

TEXTILE DRAFTING

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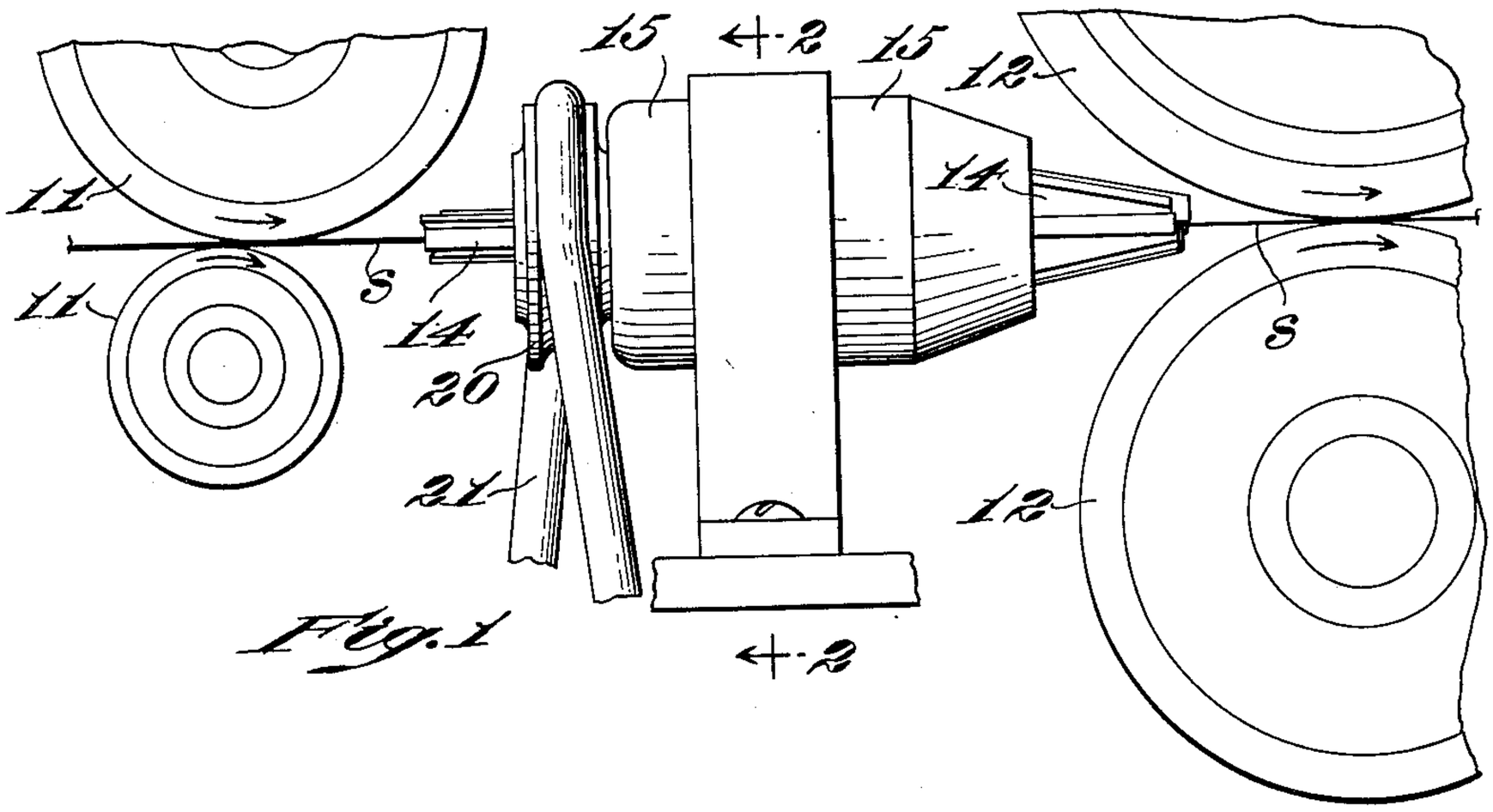

Fig. 1

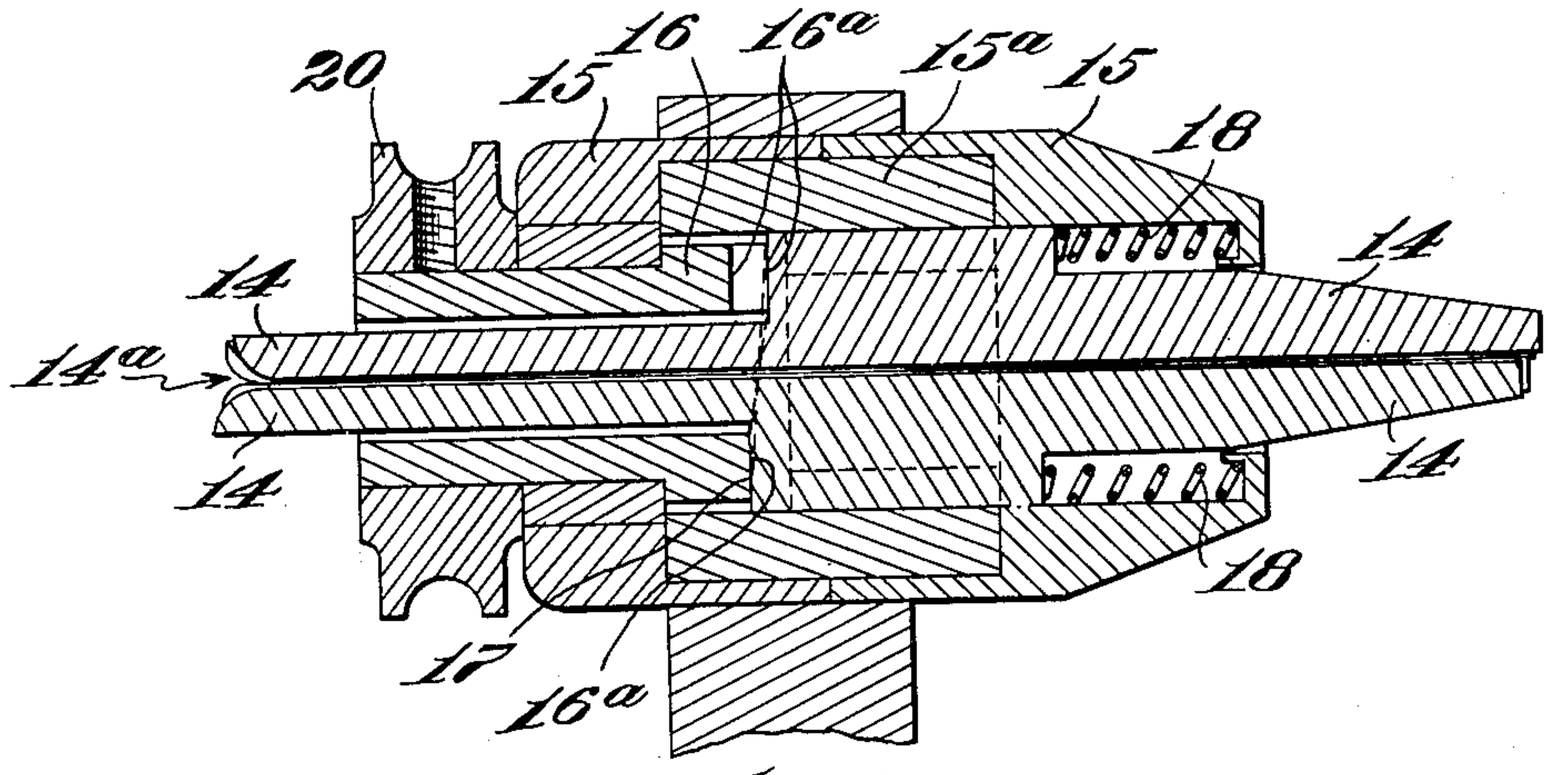

Fig. 3

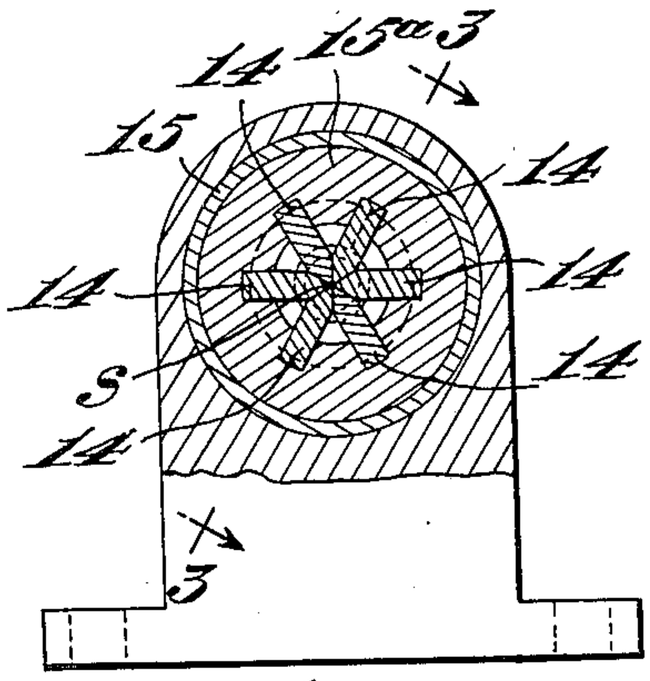

Fig. 2

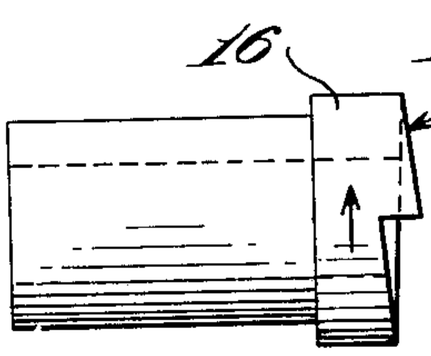

Fig. 4

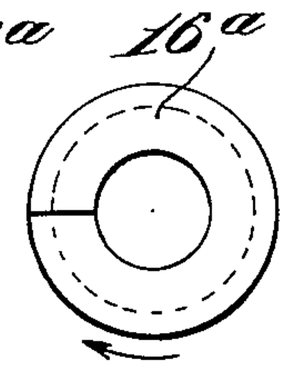

Fig. 5

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TEXTILE DRAFTING

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12 Claims. (Cl. 19—130)

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This invention relates to textile drafting.

It has long been recognized that a textile sliver that is undergoing a drafting operation may advantageously be subjected to confinement and, simultaneously, to frictional forward feeding action. Confinement of the sliver undergoing draft is desirable in order to reduce the extent to which the ends of the fibers tend to stick out from the mass of fibers of the sliver, and also to hold the sliver together firmly in a compact state so that its fibers will be in good frictional engagement with each other. It is further desirable that the confined sliver be frictionally urged forwardly toward the front drafting elements such as rolls or aprons or the like, so that those fibers whose forward ends have not yet reached the nip of the front drafting elements will nevertheless be urged along in a forward direction.

The present invention involves simultaneously confining and feeding forwardly a sliver by means of a new principle.

The principle, which will be hereinafter explained by reference to a preferred example of the invention, involves use of a plurality of members that cooperate to define a passage for the sliver, and involves the forward and backward reciprocation of these members. An advantage of the invention resides in the ability of these members to have a relatively short stroke and to be shaped and disposed so that they can extend close to cooperating drafting elements, such as rolls or aprons, either in front or in rear thereof, or both in front and in rear thereof. Thus the sliver-confining and feeding members can exert their confining and feeding action on the sliver throughout most of the drafting zone if desired, a particular advantage being that this action can be maintained up to a point very close to the nip of the front drafting elements.

The apparatus of the present invention has the further advantage of permitting a substantial increase in the draft of a given sliver, thus being adapted for "long draft" without detriment to the strength and character of the yarn.

Further advantages result from the ease with which the apparatus of the present invention can be fed or threaded, and its simplicity of construction and installation.

A preferred form of the invention is shown in the accompanying drawings in which

Fig. 1 is a side elevation of new apparatus of this invention, combined with sets of front and rear drafting elements, to confine and feed the sliver forwardly between these front and rear drafting elements;

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal sectional view taken radially on the line 3—3 of Fig. 2;

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Fig. 4 is an elevation of a rotary actuating cam of the apparatus, and

Fig. 5 is a face view of the cam of Fig. 4.

In this specification, the term "sliver" is employed to denote any textile strand, such for instance as a roving, capable of extension by draft. In the drawings the apparatus is shown as employed in the confinement and forward feeding of a sliver S as the sliver passes from the nip of a pair of rear rolls 11—11 to the nip of a pair of front draft rolls 12—12.

It will be understood that the drafting elements such as the rolls 11—11 and 12—12 can be conventional, and are diagrammatically shown in order to explain the cooperation of the new apparatus therewith.

In between the two sets of drafting elements the sliver is confined by a plurality of longitudinally extending members 14 which cooperate to define a passage for the sliver between their sliver-engaging surfaces.

Preferably the sliver passage is substantially straight and as will be seen from Fig. 1, is directed toward the line of contact or nip of the front drafting elements, Fig. 1 showing the sliver-engaging members 14 as directing the sliver in a straight path from the nip of the rear rolls 11—11 toward the nip of the front rolls 12—12.

The sliver-engaging members 14 are shown as held in a mounting comprising a two-part outer shell 15 and an inner guide block 15a, and overhanging such mounting at both ends. In order to extend well into the space between the arcuate paths of the front drafting rolls 12—12, the sliver-engaging members 14 may be tapered at their forward portions as shown in Figs. 1 and 3. At their rear ends into which the sliver is initially fed in threading up the apparatus, the inner or sliver-engaging surfaces of these members may be flared to form between them a mouth 14a for easy reception of the sliver.

A preferable arrangement of the longitudinally extending sliver-engaging members 14 is shown in Figs. 2 and 3, in which they are shown as circularly disposed around a longitudinal axis and beveled at their inner portions so as to interfit together as a group and provide narrow inwardly-facing edge surfaces which jointly define a longitudinal axial passage of appropriate diameter to engage and confine the sliver. The inner guide block 15a is appropriately grooved to receive the members 14 so that they slide upon each other and in the guide block with an easy sliding fit.

Although in Fig. 2 the sliver-engaging members are shown as disposed at equal intervals around a sliver passage of regular cross-sectional shape, such as circular, they may be disposed to form between them a passage of different cross-sec-

tional shape. Moreover they need not completely enclose the sliver as shown, but, for example, one of the sliver-engaging members might be omitted, so that the sliver would be confined between say five members but not completely enclosed because of the absence of the sixth illustrated member.

As indicated above, the sliver-engaging members **14** are reciprocable forward and backwardly and may advantageously have a very short stroke of motion, which stroke may for instance be one-quarter inch.

The sliver-engaging members are so manipulated forwardly and backwardly in out-of-phase relation that the forwardly moving area of their sliver-engaging surfaces predominates over the simultaneously backwardly moving area of said surfaces, there preferably continuously being forward motion of the major portion of the total sliver-engaging surface area of these members.

In the illustrated apparatus this is accomplished by causing the number of these sliver-engaging members that are in forward motion at any one time continuously to exceed the number of such members that are in backward motion at the time. Thus each member is shown as driven in a cycle comprising relatively slow forward motion and relatively rapid backward motion, the cycles of the several members being displaced with respect to each other by less-than-cyclic time intervals.

In the simplest embodiment of the invention there may for instance never be more than a single such member moving backwardly while two or more (in the present case, five) of these members are moving forwardly.

It might be supposed that a backwardly moving member **14** in frictional contact with the sliver would roughen the sliver, but I have found that as a practical matter such roughening does not occur, probably because the sliver-engaging surfaces of the members are smooth and, probably partly because the sliver usually has a slight twist.

A preferred and simple form of mechanism for imparting the desired motion to the sliver-engaging members includes a rotary cam **16** having a cam face **16a** (Fig. 4) engageable with shoulders **17** on the several sliver-engaging members to force them forwardly to the right in Fig. 3. As shown in Figs. 4 and 5, the cam face **16a** may for example have an even rate of rise occupying substantially its circular extent, followed by a sharp drop. The several sliver-engaging members **14** are shown as held against the face of the cam by coil springs **18** so that they return to rearward or starting position at each revolution of the cam.

The cam for reciprocating the sliver-engaging members may be continuously driven as for instance by a pulley **20** and a belt **21** connected to move in timed relation to the drafting elements such as the front rolls **12—12**. The speed at which the cam should be driven will of course depend upon the forward speed of the sliver through the apparatus.

In various drafting operations it is desirable that the members that engage the sliver in the drafting zone be continuously rotated or oscillated, about the axis of the sliver, in order to impart a twist or false twist to the sliver being drafted. For use where such twist or false twist is desirable, the mounting **15, 15** and its contained parts may be rotated or oscillated about the path of the sliver as in devices imparting a twist or false twist to the sliver in this region.

The mounting **15** and parts carried thereby may also be traversed back and forth lengthwise of the front rolls **12, 12** where this becomes desirable.

The invention is useful in permitting increase in draft without sacrifice of the strength and character of the yarn. For example the invention has been successively tested in the spinning of 40's long staple worsted yarn employing a draft of eighteen, and resulted in the production of yarn of as good a quality as produced by conventional apparatus employing a draft of six.

The illustrated apparatus is self-threading in that an end of sliver inserted through the mouth defined by the flaring rear ends of the members **14** will be frictionally drawn in and frictionally pulled through the passage between the members. The subsequent insertion of the end into the nip between the front drafting elements is facilitated by the fact that the members **14** can extend so close to this nip as to render it certain that the sliver is caught by the nip.

While the invention has been shown as applied to apparatus having conventional front and rear sets of draft rolls, the rear rolls or their equivalents may in some cases be dispensed with. The extent to which the sliver is frictionally held by the members **14** depends on the length and cross-sectional sizes of the passage between the elements and the weight or bulk of the sliver. By suitable adjustments of these, the members **14** can be caused to grip the sliver firmly enough, that is, grip firmly enough the body of fibers that have not yet been engaged by the front drafting elements, to permit the rear drafting elements to be eliminated.

I claim:

1. Mechanism defining a longitudinal passage for confining a textile sliver during lengthwise progress thereof in drafting comprising at least three members each having a sliver-engaging surface extending lengthwise of the sliver, the sliver-engaging surfaces of said members having portions coextensive as to lengthwise relation to the sliver so as to define a passage for the sliver between their sliver-engaging surfaces, and being movable forwardly and backwardly lengthwise of the sliver in out-of-phase relation and in engagement with the sliver during both their forward and backward motions.

2. In textile drafting apparatus, a mechanism for confining a textile sliver during lengthwise progress thereof comprising a plurality of members each having a sliver-engaging surface extending lengthwise of the sliver, the sliver-engaging surfaces of said members having portions coextensive as to lengthwise relation to the sliver so as to define a passage for the sliver between their sliver-engaging surfaces, and being movable forwardly and backwardly lengthwise of the sliver in out-of-phase relation and in engagement with the sliver during both their forward and backward motions, and mechanism for so moving said members.

3. In textile drafting apparatus, a mechanism for confining a textile sliver during lengthwise progress thereof comprising a plurality of members each having a sliver-engaging surface extending lengthwise of the sliver, the sliver-engaging surfaces of said members having portions coextensive as to lengthwise relation to the sliver so as to define a passage for the sliver between their sliver-engaging surfaces, and being movable forwardly and backwardly lengthwise of the sliver in out-of-phase relation and in engage-

ment with the sliver during both their forward and backward motions, the backward motions of individual such members being faster than their forward motions, and mechanism for so moving said members.

4. In textile drafting apparatus, a mechanism for confining a textile sliver during lengthwise progress thereof comprising at least three members each having a sliver-engaging surface extending lengthwise of the sliver, the sliver-engaging surfaces of said members having portions coextensive as to lengthwise relation to the sliver so as to define a passage for the sliver between their sliver-engaging surfaces, and being movable forwardly and backwardly lengthwise of the sliver in out-of-phase relation and in engagement with the sliver during both their forward and backward motions, the number of such members in forward motion continuously exceeding the number of such members in backward motions, and mechanism for so moving said members.

5. Mechanism for confining a strand of textile fibers during lengthwise progress thereof comprising a plurality of members each having a strand-engaging surface extending lengthwise of the strand, the strand-engaging surfaces of said members having portions coextensive as to lengthwise relation to the strand so as to define a passage for the strand between their strand-engaging surfaces, said members being slidable forwardly and backwardly relative to each other lengthwise of the strand, and in contact with each other and with the strand in both their forward and their backward motions, and driving mechanism for the several members arranged so to slide said members in out-of-phase relation.

6. Mechanism defining a longitudinal passage adapted to confine textile strand material during lengthwise progress thereof, including members having strand-engaging surfaces extending lengthwise of the strand material, said members being movable forwardly and backwardly lengthwise, out-of-phase relative to each other, and mechanism for so moving said members, said strand-engaging surfaces of said out-of-phase movable members having portions coextensive as to lengthwise relation to the strand and confining the strand therebetween.

7. Mechanism defining a longitudinal passage adapted to confine textile strand material during lengthwise progress thereof, including members having strand-engaging surfaces extending lengthwise of the strand material, said members being movable forwardly and backwardly lengthwise, out-of-phase relative to each other, and mechanism for so moving said members faster backwardly than forwardly, said strand-engaging surfaces of said out-of-phase movable members having portions coextensive as to lengthwise relation to the strand and confining the strand therebetween.

8. Mechanism defining a longitudinal passage adapted to confine textile strand material during lengthwise progress thereof, including at least three members having strand-engaging surfaces extending lengthwise of the strand material, said members being movable forwardly and backwardly lengthwise, out-of-phase relative to each other, and mechanism for so moving said members while maintaining the major portion of the total of the said strand-engaging surfaces in forward motion, said strand-engaging surfaces of said out-of-phase movable members having portions co-extensive as to lengthwise relation to the strand and confining the strand therebetween.

9. In apparatus arranged to draft textile strand material, mechanism defining a longitudinal passage adapted to confine textile strand material during lengthwise progress thereof, including at least three members having strand-engaging surfaces extending lengthwise of the strand material, said members being movable forwardly and backwardly lengthwise, out-of-phase relative to each other, and cam mechanism for so moving said members faster backwardly than forwardly, said strand-engaging surfaces of said out-of-phase movable members having portions coextensive as to lengthwise relation to the strand and confining the strand therebetween.

10. In apparatus arranged to draft textile strand material, a set of drafting elements having their operative surfaces approaching to a line of contact in arcuate paths having a space between such paths, at least three members having strand-engaging surfaces extending lengthwise of the strand material and into said space between said arcuate paths, said members being movable forwardly and backwardly lengthwise, out-of-phase relative to each other, and mechanism for so moving said members faster backwardly than forwardly, said strand-engaging surfaces of said out-of-phase movable members having portions coextensive as to lengthwise relation to the strand and confining the strand therebetween.

11. In textile drafting apparatus including a set of drafting elements at the front of a drafting zone, mechanism arranged to confine textile strand material in the drafting zone and deliver the strand material to said drafting elements, said mechanism including at least three members having strand-engaging surfaces extending lengthwise of the strand material, said members being movable forwardly and backwardly lengthwise, out-of-phase relative to each other and in engagement with the strand material during their forward and their backward motions, and mechanism for so moving said members, said strand-engaging surfaces of said out-of-phase movable members having portions coextensive as to lengthwise relation to the strand and confining the strand therebetween.

12. In textile drafting apparatus including a set of drafting elements at the front of a drafting zone, mechanism arranged to confine textile strand material in the drafting zone and deliver the strand material to said drafting elements, said mechanism including at least three members having strand-engaging surfaces extending lengthwise of the strand material, said members being movable forwardly and backwardly lengthwise, out-of-phase relative to each other and in engagement with the strand material during their forward and their backward motions, and mechanism for so moving said members faster backwardly than forwardly, said strand-engaging surfaces of said out-of-phase movable members having portions coextensive as to lengthwise relation to the strand and confining the strand therebetween.

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