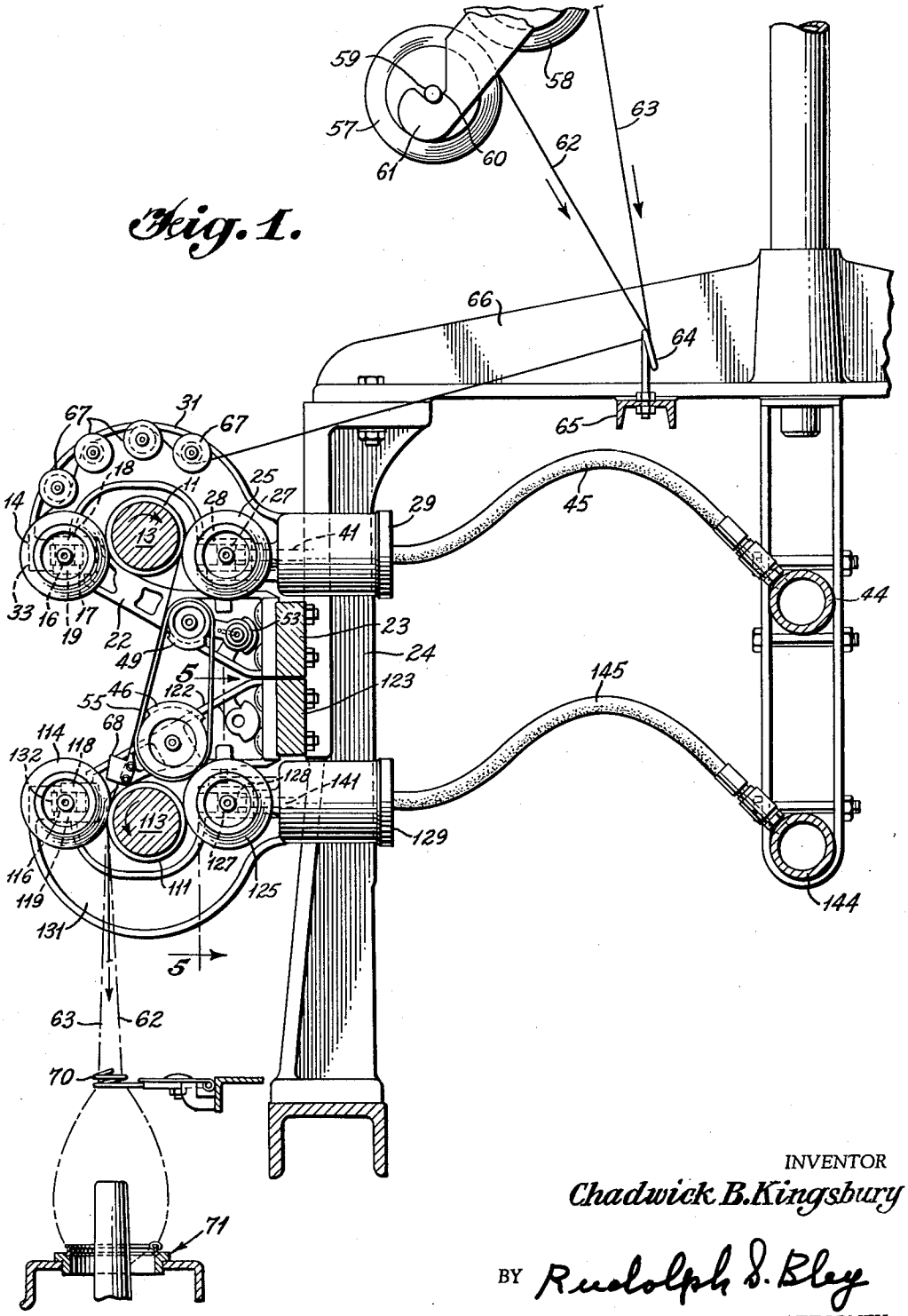
Oct. 30, 1962 C. B. KINGSBURY 3,060,669

DRAFTING APPARATUS

Filed Feb. 2, 1960 4 Sheets-Sheet 1

Fig. 1.



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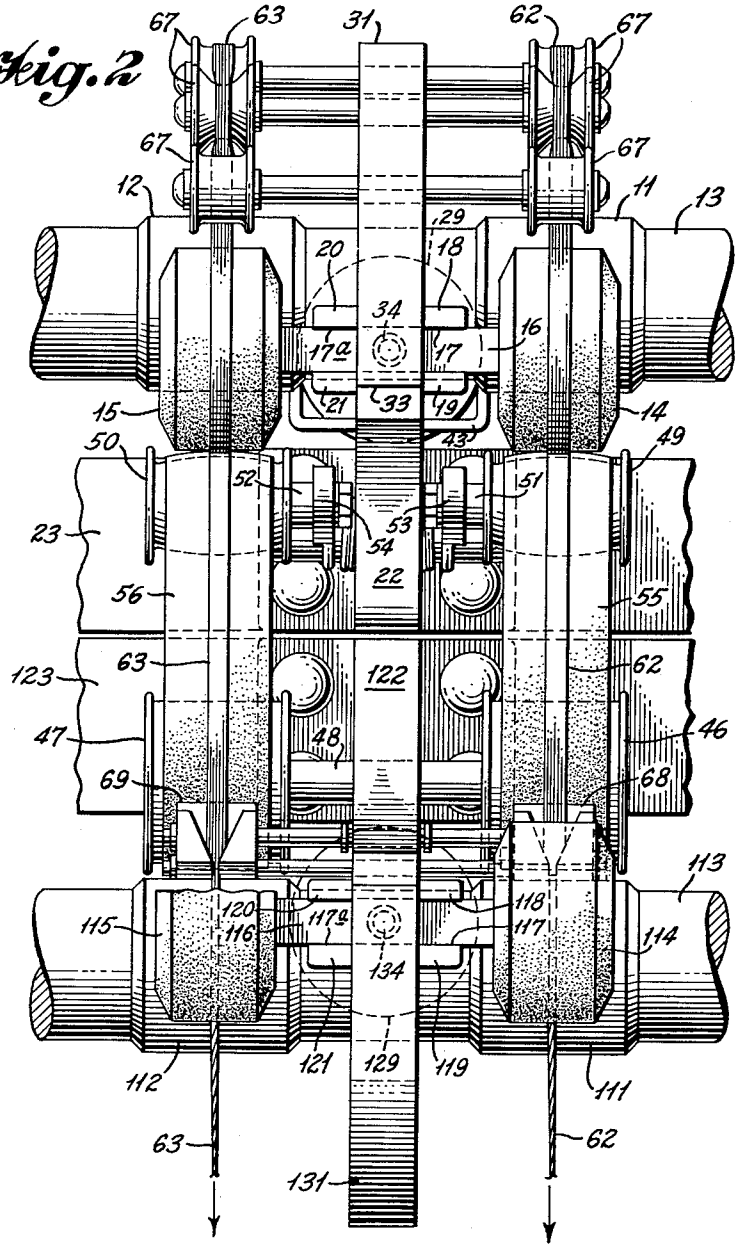
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DRAFTING APPARATUS

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Fig. 2



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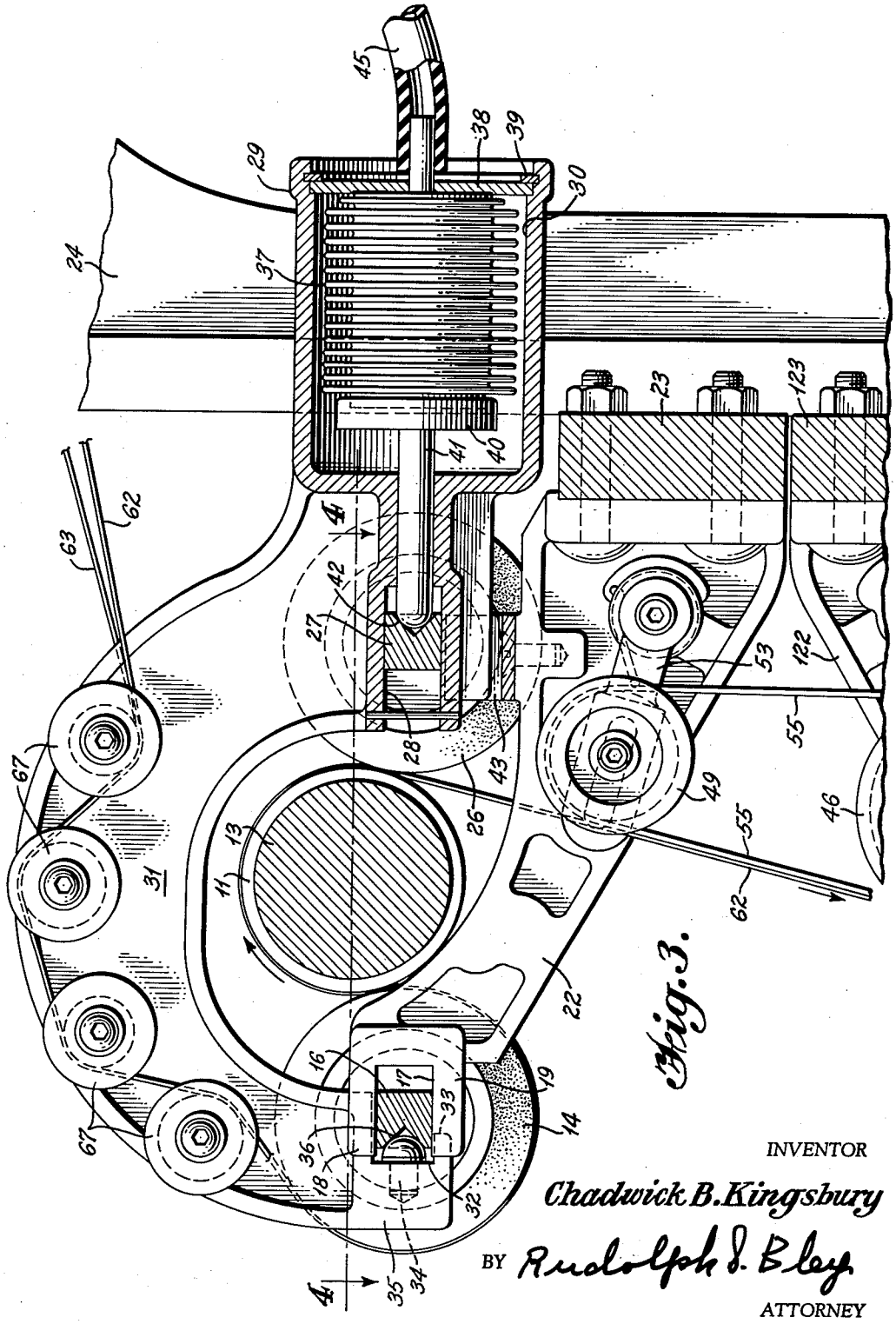


Fig. 3.

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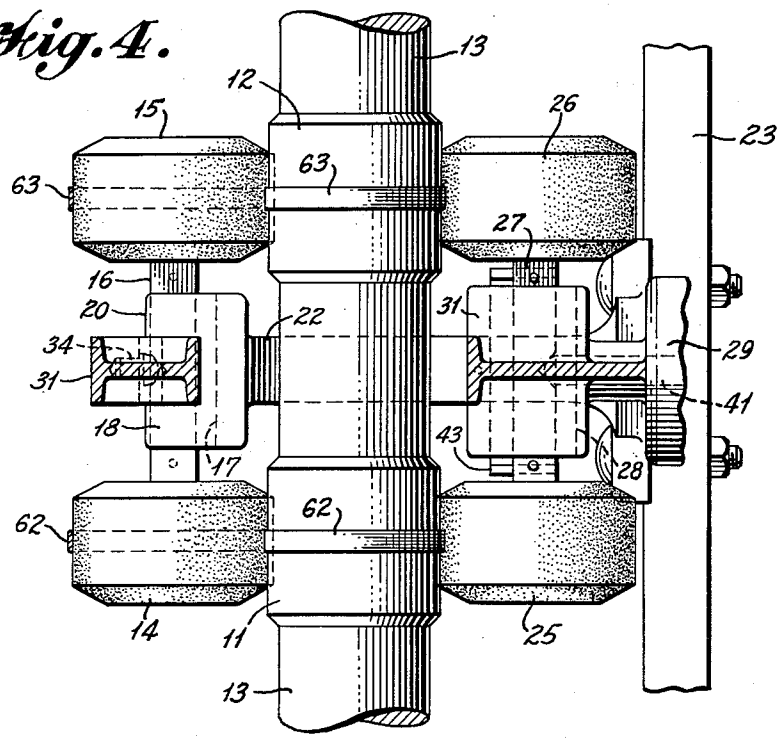
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DRAFTING APPARATUS

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Fig. 4.



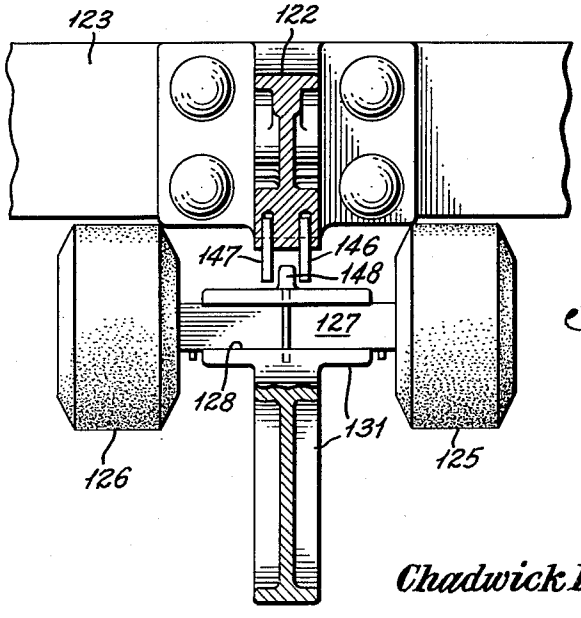


Fig. 5.

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3,060,669

DRAFTING APPARATUS

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Filed Feb. 2, 1960, Ser. No. 6,170
17 Claims. (Cl. 57—36)

This invention relates to a machine for the production of spun yarn from a heavy tow composed of a plurality of continuous filaments. More particularly it relates to a drafting apparatus for such a machine.

In the conversion of tow into spun yarn by the stretch-break system a set of back or feed rolls draws a bundle of continuous filaments into a drafting zone where the filaments are broken by passing the bundle through a set of front or delivery rolls driven at a surface speed substantially higher than the surface speed of the feed rolls. An apron, a trough, or the like, extending from the feed to the delivery rolls supports the fiber bundle in the drafting zone. It will be recognized that satisfactory results can be obtained with this apparatus only if the required roll pressure can be maintained at all times in both the feed and the delivery roll systems.

It is therefore an object of this invention to provide means for maintaining uniform roller pressure in the drafting apparatus of a stretch-break spinning machine.

It is a further object to provide a fluid system for applying pressure to the drafting rolls of a stretch-break spinning machine.

It is a still further object to provide a fluid system for applying pressure to the rolls of a plurality of stretch-break drafting systems.

It is another object to provide a fluid pressure system for a plurality of stretch-break drafting systems in which the roll pressures do not vary from place to place.

Other and further objects of this invention will be apparent to those skilled in the art to which it relates and from the following specification and claims and from the drawing.

Referring to the drawing briefly:

FIG. 1 is a side view of a spinning place of a stretch-break spinning machine incorporating this invention;

FIG. 2 is a front view of a drafting apparatus of the machine;

FIG. 3 is a side view, partly in section, of the feed roll system of the drafting apparatus:

FIG. 4 is a sectional view along the line 4—4 of FIG. 3; and

FIG. 5 is a sectional view along the line 5—5 of FIG. 1.

A stretch-break direct spinning machine consists of a tow breaking and drafting apparatus, and a spinning system, such as a conventional cotton spinning system. The breaking and drafting apparatus breaks the tow into a sliver of staple fibers and drafts the sliver to the extent required for the production of a spun yarn of the desired count. This drafted sliver is passed directly to the spinning system where it is converted into a spun yarn. Since the spinning system per se is conventional, this portion of the machine will not be described in detail.

Referring now to FIGS. 1 and 2 it will be seen that feed rolls 11 and 12 of the tow breaking and drafting apparatus shown are mounted on shaft 13 which extends the length of the machine and which is provided with similar pairs of feed rolls at each of a plurality of positions. Shaft 13 is power driven through suitable gears at the end of the machine. Feed rolls 14 and 15 are mounted on shaft 16 which is horizontally movable in a pair of slots 17 and 17*a* formed by two pairs of members 18, 19 and 20, 21 extending outwardly from the free end of bracket 22. Bracket 22 is firmly secured to horizontal support member 23 which, in turn, is firmly secured to vertical support members 24, commonly known as roll stands. Feed rolls 25 and 26 are mounted on shaft 27 which is horizontally movable in slot 28 in yoke 31, an extension of housing 29. Yoke 31 has an inwardly facing horizontal slot 32 across its free end 33. This free end of yoke 31 is positioned between the pairs of outwardly extending members 18, 19 and 20, 21 of bracket 22 so that the buttonhead of rivet 34, positioned in side wall 35 of slot 32, can be pressed into conical detent 36 in shaft 16.

One end of bellows 37 in cavity 30 bears against washer 38 which is secured to housing 29 by means of snap ring 39, while the other end of the bellows bears against head 40 of plunger 41. Plunger 41 passes through a bore in housing 29 and yoke 31 located so that the rounded end of the plunger can be pressed into conical detent 42 in shaft 27. When compressed air or other fluid is admitted to the bellows through manifold 44 and flexible tubing 45, plunger 41 is pressed against shaft 27 causing rolls 25 and 26 to come into contact with rolls 11 and 12. Then since shaft 27 is slideably carried by support bracket 43, housing and yoke move inwardly until the buttonhead of rivet 34 is pressed against shaft 16, causing rolls 14 and 15 to come into contact with rolls 11 and 12. Since bellows 37 acts on both shafts both sets of rolls are under the same pressure. The corresponding rolls of the other positions of the machine will be under the same pressure because fluid is supplied to all bellows from a common manifold. Any pressure variation at one position, resulting from unevenness in the material being processed or the like, will be distributed over the entire machine through this common manifold and therefore minimized. Pressure can be applied to or released on all sets of rolls by means of a fluid supply control for the entire machine.

The delivery roll system is similar to the feed roll system and can therefore be described quite briefly. Delivery rolls 111 and 112 for each position are mounted on shaft 113 which is power driven through suitable gears at the end of the machine. Delivery rolls 114 and 115 are mounted on shaft 116 which is horizontally movable in slots 117 and 117*a*, formed by pairs of members 118, 119 and 120, 121 extending outwardly from the free end of bracket 122. This bracket is firmly secured to horizontal support member 123 which, in turn, is firmly secured to vertical support members 24. Rolls 125 and 126 are mounted on shaft 127 which is horizontally movable in slot 128 in yoke 131, an extension of bellows housing 129. Yoke 131 has an inwardly facing horizontal slot 132 across its free end. This free end of yoke 131 is positioned between the pairs of outwardly extending members 118, 119 and 120, 121 of bracket 122 so that the buttonhead of rivet 134, positioned in the side wall of slot 132, can be pressed into a conical detent in shaft 116.

The rounded end of plunger 141, actuated by a bellows system identical with that in housing 29, can be pressed into a conical detent in shaft 127.

When compressed air or other fluid is admitted to the bellows through manifold 144 and flexible tubing 145, rolls 125 and 126 and rolls 114 and 115 are brought into contact with rolls 111 and 112 under the desired pressure, as explained earlier in the description of the feed roll system. Alignment between yoke 131 and bracket 122 is maintained by a pair of members 146 and 147 extending downwardly from the bracket and straddling upper member 148 of yoke 131.

Lower apron transport rolls 46 and 47 are mounted on shaft 48 fixed transversely in bracket 122. Upper apron transport rolls 49 and 50 are mounted on studs 51 and 52 secured to spring-urged tightener arms 53 and 54 pivotally mounted on bracket 22. Transport aprons 55

and 56 are held under tension by these pairs of apron transport rolls. Rolls 46 and 47 are positioned so that the aprons are in contact with rolls 125 and 126 when these rolls are in operating contact with rolls 111 and 112. Thus the aprons are driven by rolls 111 and 112 through rolls 125 and 126. Apron transport rolls 46 and 47 also limit the upward movement of rolls 125 and 126.

To operate the machine packages of tow 57 and 58 on arbors 59 are placed in notches 60 of fork members 61 of the creel. Tow ends 62 and 63 are drawn through guides 64 positioned on longitudinal channel 65 secured to the lower side of creel support member 66.

The ends of tow are passed about one or more guides 67 positioned along yoke 31 to apply a slight tension and to position the tow on the center lines of the spindles. The ends are then passed into the nips of rolls 11 and 14 and of rolls 12 and 15, respectively, and then into the nips of rolls 11 and 25 and of rolls 12 and 26, respectively. Aprons 55 and 56 transport the slivers to condensers 68 and 69 positioned on the center lines of the spindles. After leaving the condensers the slivers are passed into the nips of rolls 111 and 114 and of rolls 112 and 115, respectively. Delivery rolls 111 and 112 are driven at a substantially higher speed than feed rolls 11 and 12 to break the filaments and to draft the resulting slivers to the extent required for the direct production of spun yarn of the desired count. Since aprons 55 and 56 are driven by rolls 125 and 126 of the delivery system, the surface speed of the transport aprons is the same as the surface speed of the delivery rolls. The slivers are passed through thread guides 70 to ring twisters 71 where they are converted into spun yarn.

It is to be understood that a machine of this type consists of a plurality of the drafting and breaking places described arranged to form a double sided machine. The roll pressures at all places on the machine are the same because the pressure is applied through the common manifolds.

While I have described this invention in detail with respect to certain embodiments thereof, it is not desired to limit it to the details described and illustrated except insofar as they are set forth in the following claims.

What is claimed is:

1. A tow breaking and drafting apparatus comprising a set of feed rolls and a set of delivery rolls for advancing a strand of textile filaments, the delivery rolls running at a surface speed sufficiently higher than that of the feed rolls to break the filaments and to draft the resulting strand of fibers, each of said sets of rolls comprising a fixed bracket member provided with a slot, a yoke member provided with a slot, said yoke member being free to move in alignment with said bracket member, a positively driven roll, on one side of said positively driven roll and frictionally driven thereby a second roll rotating on a shaft movable in the slot in said fixed bracket member, on the opposite side of said positively driven roll and frictionally driven thereby a third roll rotating on a shaft movable in the slot in said yoke member, said yoke member having one end positioned to limit the outward movement of the shaft of said second roll, an expansible member secured to the opposite end of said yoke member, means actuated by said expansible member for urging the shaft of said third roll toward said positively driven roll, and means for applying fluid pressure to said expansible member.

2. A tow breaking and drafting apparatus comprising a feed roll system and a delivery roll system for advancing strands of textile filaments, the delivery rolls running at a surface speed sufficiently higher than that of the feed rolls to break the filaments and to draft the resulting strands of fibers, each roll system comprising a fixed bracket member provided with a slot, a yoke member provided with a slot, said yoke member being free to move in alignment with said bracket member, a pair of positively driven rolls, on one side of said positively driven rolls and frictionally driven thereby a pair of second rolls rotating on a shaft movable in the slot in said fixed bracket member, on the opposite side of said positively driven rolls and frictionally driven thereby a pair of third rolls rotating on a shaft movable in the slot in said yoke member, said yoke member having one end positioned to limit the outward movement of the shaft of said pair of second rolls, an expansible member secured to the opposite end of said yoke member, means actuated by said expansible member for urging the shaft of said pair of third rolls toward said positively driven rolls, and means for applying fluid pressure to said expansible member.

3. A tow breaking and drafting apparatus as defined in claim 2 having means for conveying the strands from the feed rolls to the delivery rolls.

4. A tow breaking and drafting apparatus as defined in claim 3 in which the strand conveying means is an apron.

5. A tow breaking and drafting apparatus comprising a feed roll system and a delivery roll system for advancing strands of textile filaments, the delivery rolls running at a surface speed sufficiently higher than that of the feed rolls to break the filaments and to draft the resulting strand of fibers, each roll system comprising a fixed bracket member provided with a slot, a yoke member provided with a slot, said yoke member being free to move in alignment with said bracket member, a pair of positively driven rolls, on one side of said positively driven rolls and frictionally driven thereby a pair of second rolls rotating on a shaft horizontally movable in the slot in said fixed bracket member, on the opposite side of said positively driven rolls and frictionally driven thereby a pair of third rolls rotating on a shaft horizontally movable in the slot in said yoke member, said yoke member having one end positioned to limit the outward movement of the shaft of said pair of second rolls, an expansible member secured to the opposite end of said yoke member, means actuated by said expansible member for urging the shaft of said pair of third rolls toward said positively driven rolls, means for applying fluid pressure to said expansible member, apron transport rolls adjacent said feed roll system, second apron transport rolls adjacent said delivery roll system and driven by frictional contact with the third rolls thereof, and transport aprons held under tension by said rolls.

6. A direct spinning machine comprising a plurality of tow breaking and drafting devices and twisting spindles, the tow breaking and drafting devices comprising a feed roll system and a delivery roll system for advancing strands of textile filaments, the delivery rolls running at a surface speed sufficiently higher than that of the feed rolls to break the filaments and to draft the resulting strand of fibers, each roll system comprising a fixed bracket member provided with a slot, a yoke member provided with a slot, said yoke member being free to move in alignment with said bracket member, a positively driven roll, on one side of said positively driven roll and frictionally driven thereby a second roll rotating on a shaft movable in the slot in said fixed bracket member, on the opposite side of said positively driven roll and frictionally driven thereby a third roll rotating on a shaft movable in the slot in said yoke member, said yoke member having one end positioned to limit the outward movement of the shaft of said second roll, an expansible member secured to the opposite end of said yoke member, means actuated by said expansible member for urging the shaft of said third roll toward said positively driven roll, means for applying fluid pressure to all of said feed roll system expansible members, and means for applying fluid pressure to all of said delivery roll system expansible members.

7. A direct spinning machine as defined in claim 6

having means for conveying the strands from the feed rolls to the delivery rolls.

8. A direct spinning machine as defined in claim 7 in which the strand conveying means are aprons.

9. A direct spinning machine comprising a plurality of tow breaking and drafting devices and twisting spindles, the tow breaking and drafting devices comprising a feed roll system and a delivery roll system for advancing strands of textile filaments, the delivery rolls running at a surface speed sufficiently higher than that of the feed rolls to break the filaments and to draft the resulting strands of fibers, each roll system comprising a fixed bracket member provided with a slot, a yoke member provided with a slot, said yoke member being free to move in alignment with said bracket member a pair of positively driven rolls, on one side of said positively driven rolls and frictionally driven thereby a pair of second rolls rotating on a shaft horizontally movable in the slot in said fixed bracket member, on the opposite side of said positively driven rolls and frictionally driven thereby a pair of third rolls rotating on a shaft horizontally movable in the slot in said yoke member, said yoke member having one end positioned to limit the outward movement of the shaft of said pair of second rolls, an expansible member secured by the opposite end of said yoke member, means actuated by said expansible member for urging the shaft of said pair of third rolls toward said positively driven rolls, means for applying fluid pressure to all of said feed roll system expansible members, and means for applying fluid pressure to all of said delivery roll system expansible members.

10. A direct spinning machine as defined in claim 9 having means for conveying the strands from the feed rolls to the delivery rolls.

11. A direct spinning machine as defined in claim 10 in which the strand conveying means are aprons.

12. A tow breaking and drafting apparatus as defined in claim 1 in which the expansible members are bellows.

13. A tow breaking and drafting apparatus as defined in claim 2 in which the expansible members are bellows.

14. A tow breaking and drafting apparatus as defined in claim 5 in which the expansible members are bellows.

15. A direct spinning machine as defined in claim 6 in which the expansible members are bellows.

16. A direct spinning machine as defined in claim 9 in which the expansible members are bellows.

17. In a direct spinning apparatus having a pair of strand advancing systems for breaking and drafting a tow of textile filaments, at least one of said strand advancing systems comprising a fixed bracket member provided with a slot, a yoke member provided with a slot, said yoke member being free to move in alignment with said bracket member, a positively driven roll, on one side of said positively driven roll and frictionally driven thereby a second roll rotating on a shaft movable in the slot in said fixed bracket member, on the opposite side of said positively driven roll and frictionally driven thereby a third roll movable in the slot in said yoke member, said yoke member having one end positioned to limit the outward movement of the shaft of said second roll, an expansible member secured to the opposite end of said yoke member, means actuated by said expansible member for urging the shaft of said third roll toward said positively driven roll, and means for applying fluid pressure to said expansible member.

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