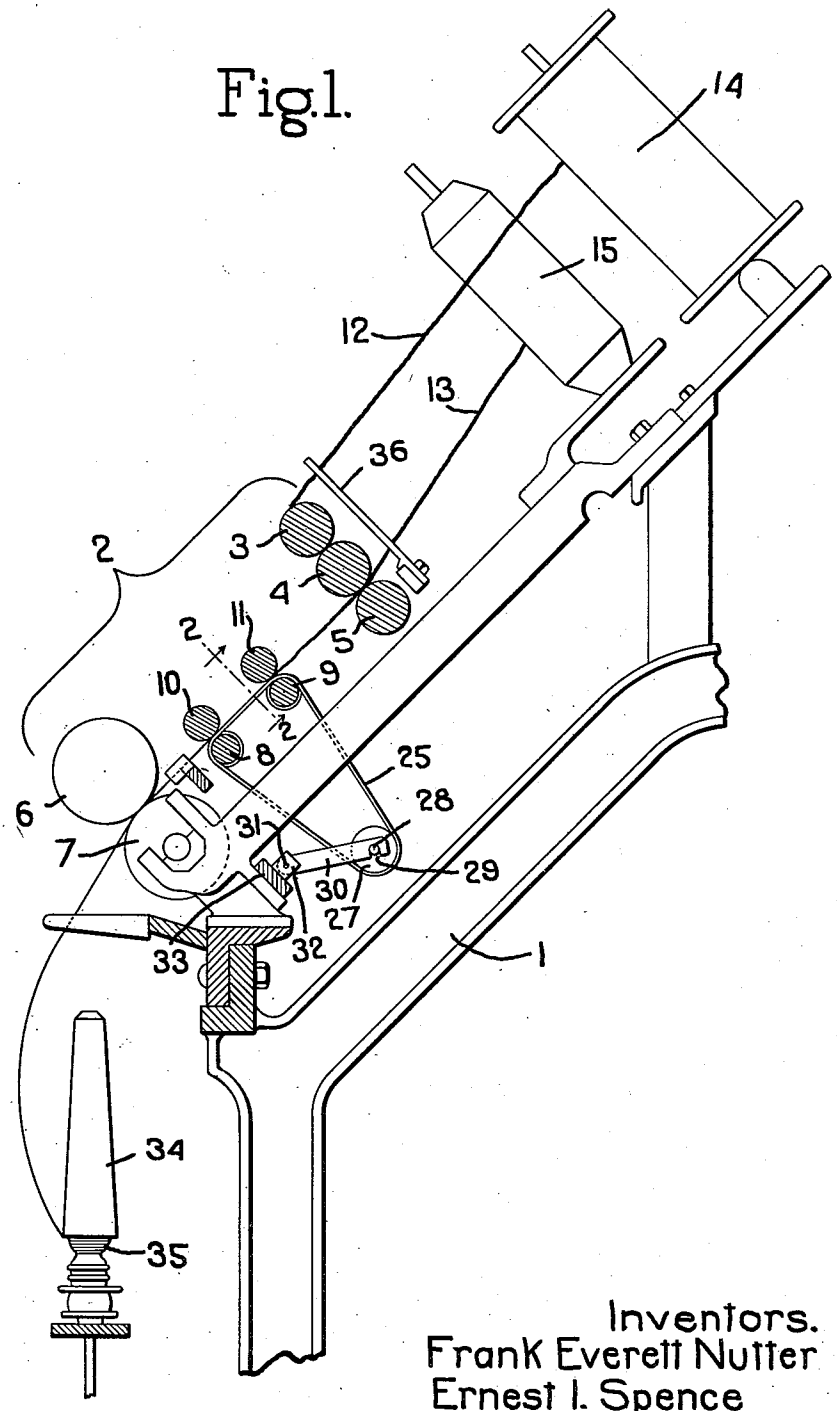
Sept. 19, 1944. F. E. NUTTER ET AL 2,358,656

METHOD OF SPINNING SINGLE PLY YARN COMPOSED OF BOTH RELATIVELY LONG AND RELATIVELY SHORT FIBERS

Filed Dec. 22, 1942 3 Sheets-Sheet 1

Fig. 1.



Inventors.
Frank Everett Nutter
Ernest I. Spence
by Heard Smith & Tennant.
Attys.

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Fig. 2.

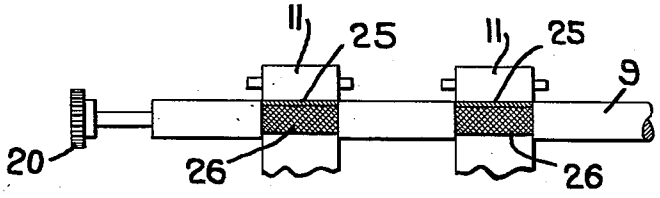


Fig. 3.

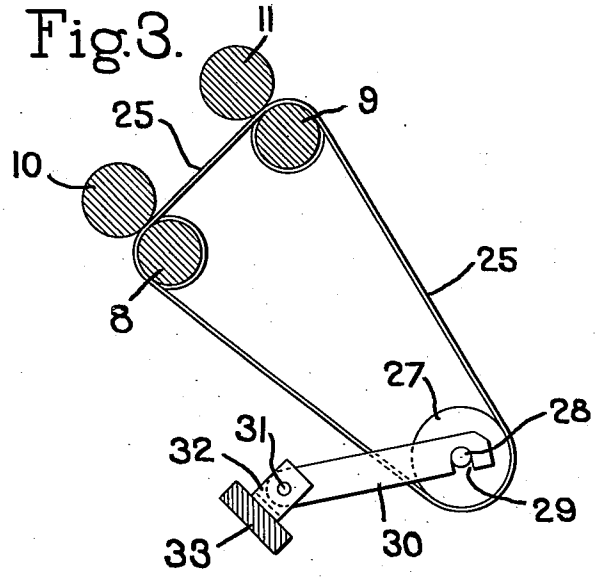


Fig. 4.

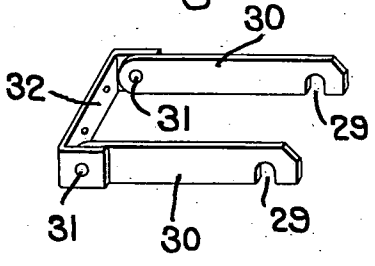
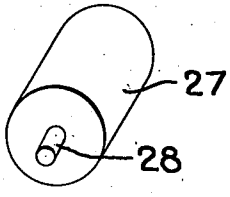


Fig. 5.



Inventors.
Frank Everett Nutter
Ernest I. Spence
by Heard Smith & Tennant
Attys.

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Fig.6.

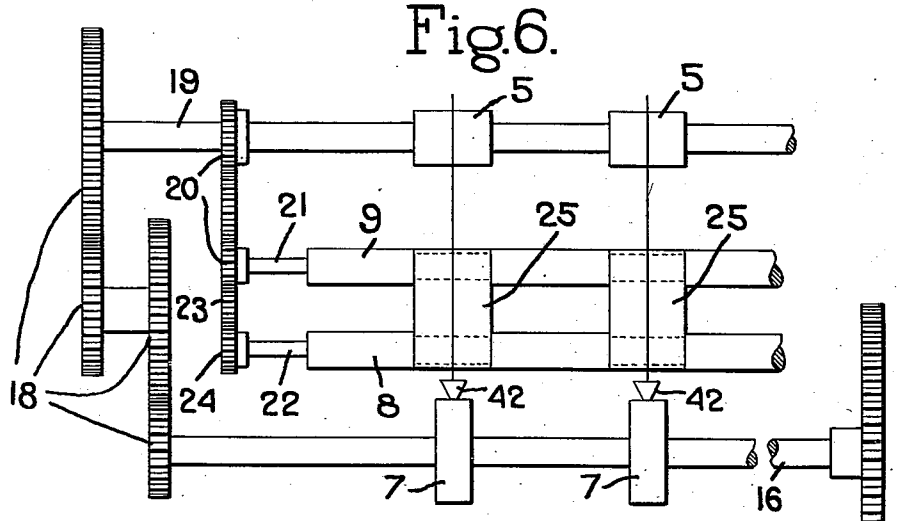


Fig.7.

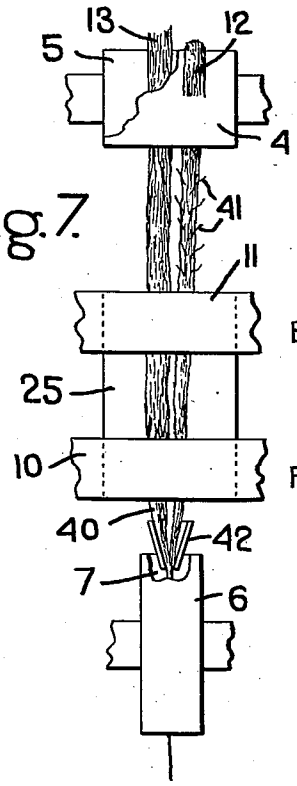
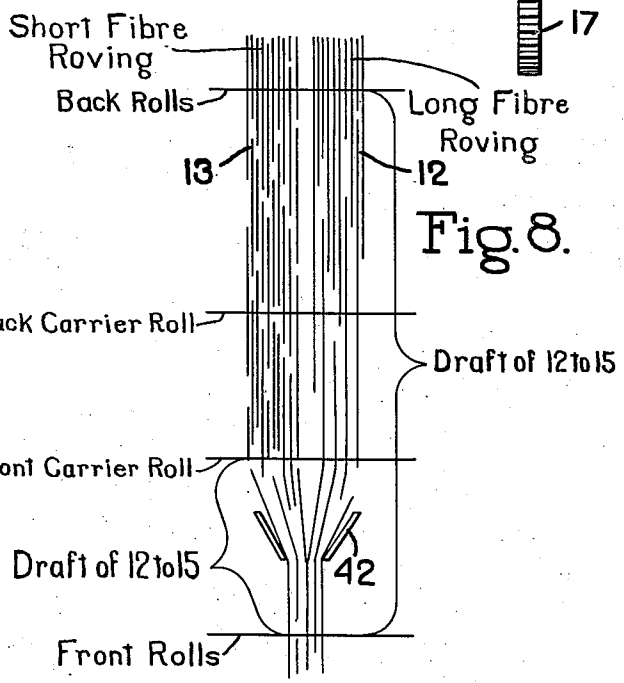


Fig.8.



Inventors.
Frank Everett Nutter
Ernest I. Spence
by Heard Smith & Tennant.
Attys.

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UNITED STATES PATENT OFFICE

2,358,656

METHOD OF SPINNING SINGLE PLY YARN COMPOSED OF BOTH RELATIVELY LONG AND RELATIVELY SHORT FIBERS

Frank Everett Nutter and Ernest I. Spence, Sanford, Maine, assignors to Goodall Worsted Company, Sanford, Maine, a corporation of Maine

Application December 22, 1942, Serial No. 469,818

2 Claims. (Cl. 57—156)

This invention relates to the manufacture of single ply yarn containing both relatively long fibers comparable in length to those of wool or mohair and relatively short fibers comparable in length to cotton fiber.

One type of spinning apparatus commonly used for spinning a yarn from a roving of relatively long fibers is that sometimes referred to as the "worsted type," of which a spinning apparatus known as the "Bradford system" is an example.

For spinning a roving of relatively short fiber such as cotton, a spinning apparatus of the so-called cotton type is commonly used.

In the U. S. patent to Nutter #2,016,387, October 8, 1935, there is disclosed a spinning apparatus operating on the Bradford system by which a single ply yarn containing both long and short fibers can be produced by feeding a long fiber roving to the back rolls of the spinning apparatus and drafting said roving between the back rolls and the front rolls to the extent that similar long fiber roving is usually drafted, and also feeding a short fiber roving to the carrier rolls and drafting said latter roving between the carrier rolls and the front rolls, the two individually drafted rovings being delivered simultaneously from the front rolls and being twisted together to produce a single ply yarn.

In the device of said Patent #2,016,387, the carrier rolls, which function as back rolls for the roving of cotton or other short fiber, operate at about the same surface speed as the back rolls, and as a result, the amount of draft given to the cotton roving is approximately the same as that given to the long fiber roving.

In spinning a roving of long fibers according to the Bradford system, it is a commonly accepted rule that the draft shall not exceed the fiber length of the stock, that is, assuming the fiber length to be 8 inches, the draft shall not exceed 8, by which is meant that the amount of attenuation of the roving between the back rolls and the front rolls shall not be more than is required to reduce the size and weight of the roving as it leaves the front rolls to one-eighth of that it had as it entered the back rolls.

If a greater draft is used, the number of filaments or fibers in the portion of the roving between the back rolls and the front rolls is so reduced that the carrier rolls do not provide sufficient friction on the roving to maintain the fibers in their true course, and as a result, many of the fibers assume a position with the trailing ends thereof projecting more or less thereby resulting in a rough yarn.

In spinning cotton and similar short staple fiber, however, it is more or less common to use a draft of from 12 to 15.

One of the objects of the present invention is to provide improvements in the apparatus and method of said Patent #2,016,387 by which the draft of the long fiber roving can be increased to that normally used in drafting a roving of short fibers such as cotton so that the two individually drafted rovings, i. e., the roving of long fibers and the roving of short fibers are both subjected to the normal draft used in drafting cotton (which, as stated above, is considerably longer than that heretofore commonly used in drafting a roving of long fiber such as wool or mohair), without, however, producing any of the disadvantages heretofore developed when a long fiber roving is subjected to a draft considerably longer than the length of the fiber.

With the present invention the two individually drafted rovings, i. e., the long fiber roving and the short fiber roving, may both be subjected to the normal amount of draft used in cotton spinning which is considerably greater than that normally used in drafting a long fiber roving according to the Bradford system, thus materially increasing the output of the spinning machine, and this can be done without impairing in any way the quality of the yarn.

In order to give an understanding of the invention, we have illustrated in the drawings a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

In the drawings:

Fig. 1 is a sectional view showing a spinning frame operating on the Bradford system and embodying our invention.

Fig. 2 is a section on the line 2—2, Fig. 1.

Fig. 3 is an enlarged sectional view showing the carrier rolls and tumbler rolls and the endless apron associated therewith.

Fig. 4 is a perspective view illustrating the support for the tension roll.

Fig. 5 is a perspective view of the tension roll.

Fig. 6 is a view illustrating the driving connections for the back rolls, front rolls, and carrier rolls of the drafting system.

Figs. 7 and 8 are diagrammatic views illustrating the drafting of the two rovings.

Referring first to Fig. 1, 1 indicates a portion of a spinning frame equipped with a drafting apparatus 2 operating on the so-called Bradford sys-

tem and which includes the back rolls 3, 4, 5; the front drafting rolls 6, 7; the intermediate carrier rolls 8, 9 and the corresponding tumbler rolls 10, 11, and also a twisting and winding device 34 for imparting the spinning twist to the yarn and winding it on a yarn receiver 35.

12 indicates a roving of relatively long fibers such as wool or mohair fibers, and 13 indicates a roving of relatively short fibers such as cotton fibers.

The long fiber roving 12 is shown as being withdrawn from a spool 14 and the short fiber roving as coming from a spool or bobbin 15 both of which are suitably mounted on the frame 1, both rovings being guided by any usual guide 36. The front drafting rolls 6, 7 and the back rolls 3, 4, 5 are so set that the space between the front and back rolls is slightly more than the fiber length of the long fiber roving 12 as usual in apparatus for drafting long fibers.

The front carrier roll 8 and its co-operating tumbler roll 10 are spaced from the front rolls 6, 7 a distance slightly greater than the length of the short fibers comprising the short fiber roving 13.

The long fiber roving 12 is fed to the back rolls in the usual way by passing over the top back roll 3, thence between the back rolls 3, 4 and around the intermediate back roll 4 and thence between said intermediate back roll 4 and the lower back roll 5. The short fiber roving 13 is delivered directly to the nip of the back rolls 4, 5.

The lower front roll 7, the lower back roll 5, and the carrier rolls 8, 9 are positively driven, while the upper front roll 6 is yieldingly held against the lower front roll, and the back rolls 3, 4 are also yieldingly held against the back roll 5 as is usual in spinning apparatus of this type.

Fig. 6 illustrates how the rolls 7, 8, 9, and 5 may be driven. The front roll 7 is mounted on a suitable shaft 16 that is provided with a driving gear 17 which is driven from any suitable source of power. This shaft 16 is connected through suitable reducing gearing 18 to the shaft 19 carrying the lower back roll 5, and said shaft 19 is connected by a train of gearing 20 to the shaft 21 carrying the carrier roll 9. The shaft 21 is connected to a shaft 22 carrying the front carrier roll 8 by gears 23, 24. The gearing 20, 23, 24 is preferably such that the carrier rolls 8, 9 will operate with approximately the same surface speed as the back rolls, but the train of gearing 18 connecting the shafts 19 and 16 is such that the surface speed of the front rolls 6, 7 is increased considerably relative to the surface speed of the back rolls over what is normally used in drafting a long fiber roving.

In fact the speed of the front rolls 6, 7 may be increased relative to that of the back rolls 4, 5 so as to produce a draft between the back and front rolls which is comparable to the normal draft used in drafting a cotton roving, and as stated above a draft of 12 to 15 or more is often used in drafting a cotton roving.

If the carrier rolls 8, 9 are operating at substantially the same surface speed as the back rolls 3, 4, 5, as stated above, then the relation between the surface speed of the front rolls 6 and 7 and that of the front carrier roll 8 will be such as to produce therebetween substantially the same amount of draft as is produced between the front rolls and the back rolls, which is a draft such as is usually used in drafting cotton or other short fiber, i. e., a draft of from 12 to 15 or more.

The short fiber roving 13 passes between the intermediate back roll 4 and the lower back roll 5 and thence passes over the carrier rolls and between the latter and the tumbler rolls, but as these carrier rolls are operating at substantially the same surface speed as the back roll 5, there will be no drafting action on the short fiber roving 13 between the back rolls and the front carrier roll. The drafting action on the short fiber roving 13 takes place between the front carrier roll 8 and its cooperating tumbler roll 9 and the front rolls, and as stated above, the speed of rotation of the front rolls is such that the short fiber roving 13 will be subjected to a draft between the carrier rolls and the front rolls which corresponds to that used in drafting a cotton or other short fiber roving and which for illustrative purposes may be considered as a draft of 12 to 15.

The long fiber roving 12 receives its back roll gripping action between the upper back roll 3 and the intermediate back roll 4, and the drafting action on this long fiber roving takes place between the back rolls and the front rolls as usual. However since the front rolls 6, 7 are operating at an increased speed sufficient to produce a draft of 12 to 15 between them and the front carrier roll, and since the back rolls are operating at substantially the same surface speed as the front carrier roll, the long fiber roving 12 will thus experience a draft of 12 to 15 in traveling from the back rolls to the front rolls. The tumbler rolls 10, 11 do not interfere at all with the drafting of the long fiber roving, because while said roving is being reduced in size as it travels from the back rolls to the front rolls, the short fiber roving 13 retains its full size until after it passes the front carrier roll 8 and the co-operating tumbler roll 10, so that the pressure of the tumbler rolls 10, 11 is taken largely by the full size short fiber roving 13, and the tumbler rolls 10, 11, which are weighted more or less, do not apply sufficient pressure to the long fiber roving during its attenuation to interfere in any way with the drafting thereof.

When a long fiber roving is given a draft of 12 to 15, said roving becomes so attenuated that the carrier rolls do not provide sufficient friction on the long fibers to maintain all of them in a true course, and the result is that some of the fibers are apt to assume a position out of their true course and with their trailing ends projecting more or less.

To avoid this difficulty, we have provided an endless apron 25, preferably of leather, which passes around the carrier rolls 8, 9 and which is driven thereby so that in passing from the rolls 9 and 11 to the rolls 8 and 10, the long fiber roving is contacting with the upper run of this endless apron.

During the drafting operation on the long fiber roving 12, as soon as the leading end of any long fiber is caught by the nip of the front rolls 6, 7, said fiber will be pulled forward rapidly because of the increased speed at which the front rolls are operating, and, as stated above, it is proposed to drive these front rolls at a speed sufficient to produce a draft of from 12 to 15.

As each of the long fibers is drawn forward rapidly by the front rolls, it is pulled over the surface of the upper run of the apron 25 which, as stated above, is traveling at a much slower surface speed than that of the front rolls. The friction of the long fibers on the apron 25 has the effect of maintaining the fibers in their true course and preventing the trailing ends of the fibers from taking laterally projecting positions. Moreover,

the upper run of this apron serves to support the highly attenuated long fiber roving and thus prevents rupture or breakage thereof.

This is shown diagrammatically in Figs. 7 and 8. In Fig. 7, the attenuation or drafting of the two rovings is shown by a reduction in the diameter thereof, while in Fig. 8, this is shown by shading. In Fig. 7, for instance, there is shown the front rolls 6 and 7, the tumbler rolls 10 and 11 and the back rolls 4 and 5. The short fiber roving 13 is shown as passing between the back rolls 4 and 5 and then underneath the tumbler rolls 11 and 10 and thence to the front rolls. The drafting of this short fiber roving between the front carrier rolls and the front rolls is indicated by the tapered shape of the portion 40 of said roving.

The long fiber roving 12 is shown passing over the intermediate back roll 5 (it being understood that this roving passes over the top back roll 3 and thence between said back roll 3 and the intermediate back roll 4) and then passing over the carrier rolls to the front rolls. As stated above, the drafting of this long fiber roving takes place between the back rolls and the front rolls, an operation which is indicated by the tapered shape of the portion of the roving between said back rolls and front rolls.

In this long fiber roving, the trailing ends of some of the fibers tend to take a position extending laterally from the roving as indicated at 41 in Fig. 7. When the front end of each long fiber of the roving 41 is gripped by the front rolls 6 and 7, it will be drawn rapidly forward between the carrier rolls and tumbler rolls and over the apron 25. As stated above, the friction of these fibers on the apron is sufficient to bring the trailing ends 41 into line with the direction of movement of the fiber thereby causing the fibers to maintain throughout their length a true course and produce a smoother attenuated roving.

Situated immediately in the rear of the front carrier rolls is a trumpet 42 through which the attenuated rovings pass as they are delivered to the front rolls. The wide end of this trumpet is of sufficient dimension to receive both rovings, and it serves the purpose of bringing the two attenuated rovings together at the nip of the front rolls 6, 7.

This trumpet has a further effect in producing a smooth drafted roving relatively free from objectionable protruding fiber ends.

In Fig. 8 the positions of the back rolls, carrier rolls, and front rolls are shown by transverse lines, and the lining in said figure indicates the drafting operation of the two rovings. This figure is intended to show how the short fiber roving 13 is given a draft of from 12 to 15 between the front carrier rolls and the front rolls and how the long fiber roving is given the same draft of 12 to 15 between the back rolls and the front rolls, such draft of 12 to 15 being considerably greater than that to which rovings of wool, mohair or other long fiber is usually subjected.

The carrier rolls are shown as formed with necked portions 26 to receive the endless apron 25 so that the outer surface of the apron comes flush with the surface of the rolls.

To keep the apron taut, we employ a tension roll 27 which occupies the lower loop of the apron and which is provided at its ends with trunnions 28 that are received in open bearings 29 formed in arms 30 that are pivoted at 31 to a U-shaped bracket 32 which in turn is secured to the portion 33 of the frame.

While we have referred above to producing a draft of 12 to 15 in both rovings, yet such reference is intended to be illustrative only as the invention would not be departed from if the amount of draft varied somewhat from the 12 to 15 limits mentioned.

We claim:

1. The method of spinning a single ply yarn composed of both relatively long fibers comparable in length to mohair fiber and relatively short fibers comparable in length to cotton fiber on a spinning machine operating on the so-called Bradford system and having back rolls, front drafting rolls and front and back carrier rolls intermediate the front drafting rolls and the back rolls and in which the front drafting rolls are properly spaced from the back rolls for drafting a roving of the relatively long fibers and are properly spaced from the front carrier roll for drafting a roving of the relatively short fibers, which method consists in feeding to the back rolls two rovings, one composed of the relatively long fibers and the other composed of the relatively short fibers, drafting the roving of relatively short fiber between the front rolls and the front carrier roll and operating said front drafting rolls at a surface speed relative to the front carrier roll which will produce a draft of the relatively short fiber roving that corresponds substantially to the draft which said relatively short fiber roving would normally receive when drafted according to the so-called "cotton" system, drafting the roving of relatively long fibers between the front rolls and the back rolls and operating the back rolls at substantially the same surface speed as that of the front carrier roll thereby producing a draft of the roving of relatively long fibers which also corresponds to the draft usually given to a short fiber roving when drafted according to the so-called cotton system and which is considerably greater than that which would normally be given to the said roving of relatively long fibers if drafted according to the Bradford system and supporting the portions of the long fiber roving between the front and back carrier rolls on a traveling belt which is moving at the same surface speed as that of the carrier rolls, thereby reducing danger of breakage of the highly attenuated long fiber roving and eliminating the existence of wild fibers therein.

2. A method of spinning a single ply yarn composed of both relatively long fibers comparable in length to mohair fiber and relatively short fibers comparable in length to cotton fiber on a spinning machine operating on the so-called Bradford system and having three superposed back rolls, front drafting rolls and carrier rolls with cooperating weighted tumbler rolls between the back rolls and front rolls, and in which the front rolls are properly spaced from the back rolls for drafting a roving of the relatively long fiber and are properly spaced from the front carrier roll for drafting a roving of the relatively short fibers, which method consists in so feeding a roving of the long fibers to the back rolls that said roving receives its back-roll grip between the top and intermediate back rolls, feeding a roving of the relatively short fibers to the lower two back rolls, drafting the roving of relatively short fiber between the front drafting rolls and the front carrier roll and operating the front drafting roll at a surface speed relative to the front carrier roll which will produce a draft of the relatively short fiber roving that corresponds substantially to the draft which such a roving normally receives when

drafted according to the so-called "cotton" system, drafting the roving of relatively long fiber between the front drafting rolls and the back rolls and operating the back rolls and the front carrier roll at substantially the same surface speed, thereby producing in the roving of relatively long fiber a draft of substantially the same extent as that given to a cotton roving when drafted according to the cotton system and which is considerably greater than the draft that would normally be given to said long fiber roving when drafted according to the Bradford system.

FRANK EVERETT NUTTER.
ERNEST I. SPENCE.