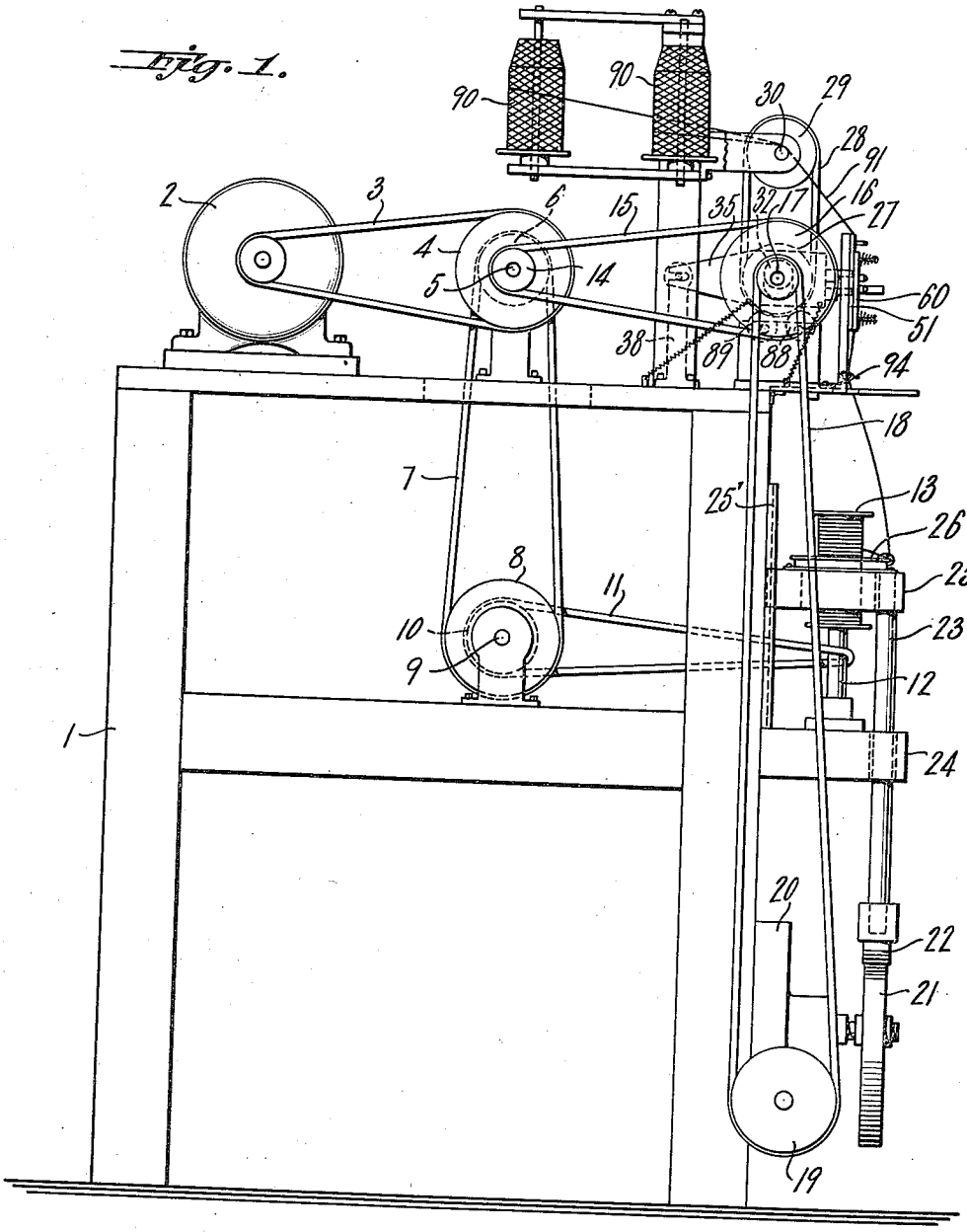
March 8, 1938. B. H. FOSTER 2,110,215

METHOD AND APPARATUS FOR TREATING TEXTILE FIBERS

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Fig. 1.



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METHOD AND APPARATUS FOR TREATING TEXTILE FIBERS

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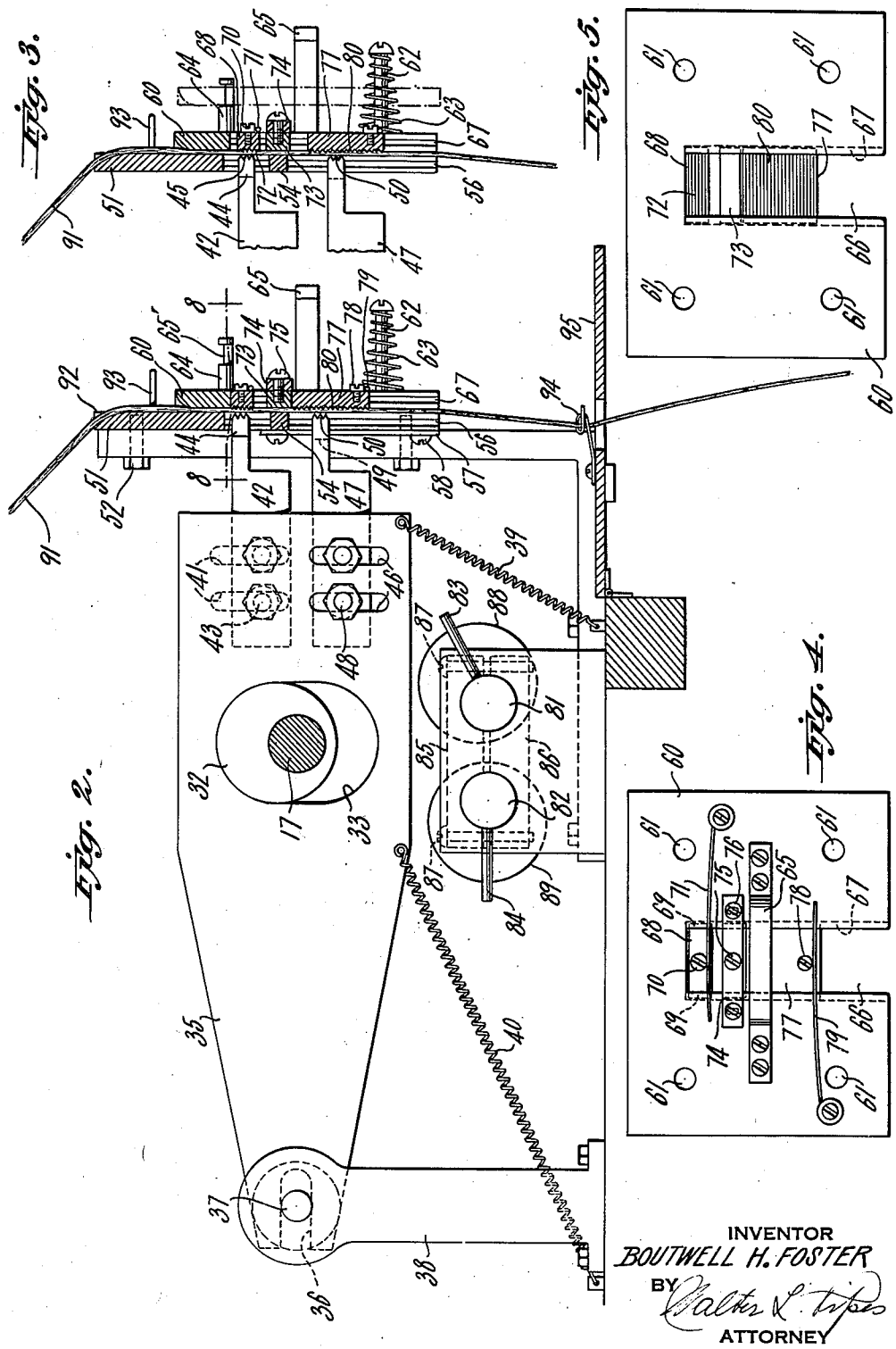


Fig. 2.

Fig. 3.

Fig. 5.

Fig. 4.

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METHOD AND APPARATUS FOR TREATING TEXTILE FIBERS

Filed Oct. 15, 1936 3 Sheets-Sheet 3

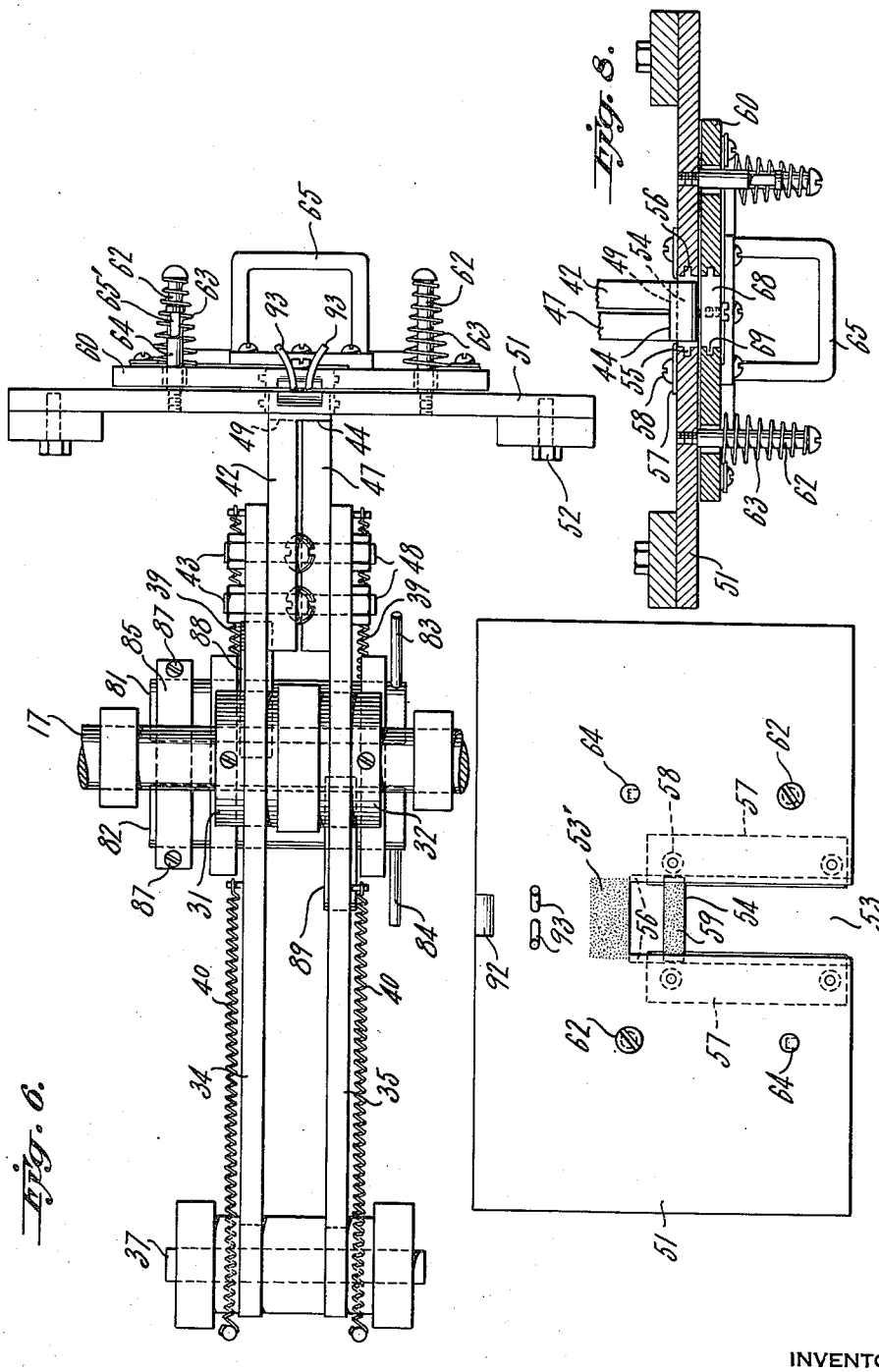


Fig. 6.

Fig. 8.

Fig. 7.

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UNITED STATES PATENT OFFICE

2,110,215

METHOD AND APPARATUS FOR TREATING TEXTILE FIBERS

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Application October 15, 1936, Serial No. 105,698

41 Claims. (Cl. 118—38)

This invention relates to a new and improved method and apparatus for treating textile fibers, and more particularly to a drafting method and apparatus of special application in the drafting of short fibers.

In usual drafting methods and apparatus as at present known, the drafting of fibers is accomplished by means of pairs of drafting rolls, the roving or strand to be drafted being fed between one pair of rolls and then nipped between a second pair of rolls rotating at a higher peripheral speed so that the fibers are drawn out and more or less paralleled. The shorter the fibers being drafted, the closer the pairs of rolls must be placed, but in the case of exceptionally short fibers, it is not practicable to draft by the use of the usual rolls without auxiliary mechanism, because they cannot be placed close enough without making the rolls so small in diameter that their commercial use on common shafts in a long spinning frame is impractical. This is particularly the case in the making of asbestos yarns. Asbestos fiber of long staple is too scarce and expensive for use in making yarns for many purposes, and as a consequence the prior methods of making commercial asbestos yarn employ asbestos of short staple and have not included the step of drafting at all. These yarns have been made by incorporating a suitable amount of cotton or other longer fiber with the relatively short asbestos fiber and, after forming rovings, these latter are simply compacted by means of rub aprons and then twisted without any drafting. As a result asbestos yarns have always been of the same weight per unit of length, or "cut-size", as the rovings from which they were made, and it has not been commercially practical to make very fine sizes of asbestos yarn.

An object of the present invention is to provide an improved method of drafting textile fibers.

Another object is to provide a method particularly well adapted for drafting relatively short fibers.

Another object is to provide a method for drafting asbestos fibers, and without addition of longer staple organic fibers.

Another object is to provide a method of drafting textile fibers which obviates or substantially reduces strain on the fibers incident to the usual drafting methods.

Another object is to provide an intermittently operating drafting method.

A further object is to provide an improved apparatus for drafting textile fibers which may vary in length from the very short asbestos fibers to the much longer wool, cotton or other fibers.

A further object is to provide apparatus for drafting fibers of a staple too short to be drafted by the usual drafting rolls, and more particularly short staple asbestos fibers.

A still further object is to provide a drafting apparatus which will give a yarn production comparable with that of ring spinning, while at the same time producing a soft quality yarn having the characteristics of yarn produced by mule spinning.

A still further object is to provide a drafting apparatus operating with an intermittent action.

Other objects will appear from the detailed description and drawings, in which latter:

Fig. 1 is a side elevation of a complete apparatus for drafting one or more strands into a single finer strand;

Fig. 2 is a side elevation, partly in section, of the drafting mechanism per se;

Fig. 3 is a detailed section corresponding to Fig. 2 but showing the parts in another position;

Fig. 4 is a front elevation of parts shown in Figs. 2 and 3;

Fig. 5 is a rear elevation corresponding to Fig. 4;

Fig. 6 is a top plan view of the mechanism shown in Fig. 2;

Fig. 7 is a detail; and

Fig. 8 is a section on the line 8—8 of Fig. 2.

The method broadly comprises feeding (longitudinally) a strand or strands of loosely aggregated parallel fibers, such as a roving, and attenuating or drafting the strand by applying progressively thereto a succession of draft impulses at spaced intervals along the strand. More particularly, the method comprises intermittently advancing a strand of fibers, and attenuating the strand by applying intermittent draft impulses progressively to a succession of partially coincident or overlapping fixed lengths of the advancing strand.

In its principal embodiment, viz., the production of yarn, the method also includes twisting the drafted strand. When thus combined with a continuous twisting operation, the method is further characterized in that each draft impulse is applied directly to a portion of the strand which has already been drafted and twisted and is transmitted through said portion to the non-twisted portion which is to be drafted. This effect is accomplished by an arrangement whereby, after each draft impulse, the twist is allowed

to run back beyond the point of application of the draft impulse.

The method is also characterized in that the drafting is accomplished, not by virtue of a difference in the relative speeds of rotating feed and draft elements, but by virtue of a difference in the amplitudes of motion of reciprocating feed and draft elements.

A further distinction in the present method is that the draft impulse is applied while one end of the portion of strand being drafted is held stationary.

The method is applicable to the drafting of a single strand of fibers or to the simultaneous drafting into a composite strand of a plurality of strands. Also, in carrying out the method it may be applied to the step-wise drafting of a strand in a plurality of steps, the strand becoming more attenuated at each step. It further may include drafting while the strands are in a moistened or wet condition.

For a better understanding of the method, there will now be described one form of apparatus for carrying it out. As shown, the apparatus produces a single drafted strand, but it is obvious that in commercial use a large number of the devices will be operated simultaneously in parallel, as in the case of roll drafting frames.

Referring to the drawings, and more particularly to Fig. 1, there is shown a main frame 1 upon which is mounted an electric motor 2 for driving the apparatus. It will be understood that any other suitable form of drive may be employed. The motor 2 by means of the belt 3 drives a pulley 4 mounted on shaft 5, which shaft carries a pulley 6 which by means of belt 7 drives a pulley 8 mounted on shaft 9. A pulley 10 on shaft 9 by means of belt 11 drives the spindle 12 of a bobbin 13 upon which a drafted and twisted yarn made according to the invention may be wound by the conventional ring and traveller method.

Also mounted on the shaft 5 is a pulley 14 which through belt 15 drives a pulley 16 mounted on the shaft 17 of the drafting apparatus per se. A pulley on shaft 17 by means of belt 18 drives a pulley 19 on a reducing gear 20 which in turn rotates a suitable form of cam 21, such as a heart-shaped cam for actuating a traverse mechanism as follows: A follower 22 rests on the cam 21 and movably supports a rod 23 vertically guided in the frame of the machine at 24. A ring support or ring rail 25 is carried on the rod 23, and is also guided by the rails 25', and mounted upon the ring rail is the usual form of ring and traveller 26.

Also mounted on the shaft 17 is a pulley 27 which through the belt 28 drives a pulley 29 which is fixed on and rotates a feed bar 30 for the roving or strand to be drafted.

Referring now more particularly to Figs. 6 and 2, there are fixedly mounted on the shaft 17 two eccentrics 31 and 32, which rotate in elongated slots 33 in the respective similar slidable rock arms 34 and 35. At their rear ends these rock arms are provided with slots 36, in which is disposed a stationary guide pin 37 mounted on bracket 38. At the bottoms of the rock arms 34 and 35 they are provided with coil springs 39 and 40 tending to urge the rock arms downwardly and rearwardly.

The rock arm 34 is provided adjacent its forward end with the vertical slots 41, and a feed dog 42 is adjustably secured to the rock arm 34 by bolts 43 passing through the slots 41. The feed dog 42 at its forward end carries a feed head 44, which by reference to Figs. 6 and 8 will be seen to be of greater width than the body of the feed dog 42 and therefore extends to one side thereof. At its forward face the feed head is ridged or toothed, as shown at 45 (Fig. 3).

In a similar manner the rock arm 35 adjacent its forward end is provided with the vertical slots 46, and a drafting dog 47 is adjustably secured to the arm 35 by the bolts 48. By means of bolts 43 and 48 the spacing of the dogs 42 and 47 may be variably fixed, as well as their location on the respective rock arms 34 and 35. At its forward end the drafting dog carries a drafting head 49 of greater width than the body of the dog, so that the head extends laterally but in a direction reverse to the feed head 44. It will be seen that by this construction the rock arms 34 and 35 may be made narrow and disposed side by side, but the feed head and the drafting head are made relatively wide and are in vertical alignment as shown in Fig. 8. The forward face of the drafting head is provided with ridges or teeth 50.

Referring now more particularly to Figs. 2, 7 and 8, a fixed plate 51 is secured to the frame of the machine by screws 52, and the plate is provided with a vertical slot or opening 53 in alignment with the feed and drafting dogs. Just above the slot 53 the surface of the forward face of the plate is roughened as shown at 53', for a reason to be later explained. Extending across the slot 53 is a stationary but adjustable bar 54, the adjustment of the bar being secured by means of tongues 55 at its ends movable in grooves 56 in the side walls of the slot 53 (see Fig. 8). In order to secure the bar 54 in adjusted position, spring plates 57 are secured to the rear face of the plate 51, by screws 58, at each side of the slot 53, and it will be noted from Fig. 8 that the inner edges of these plates slightly overlap the slot 53 and are bent slightly inwardly toward the slot so that their edges will rest with frictional pressure on the bar 54 and thereby retain it in adjusted position. The bar 54 is also provided on its forward face with a roughened surface 59, for a purpose to be later explained.

Referring now more particularly to Figs. 2 to 5, a second plate 60 is movably and resiliently mounted on plate 51 in the following manner. The plate 60 is provided with four openings 61, through two diametrically opposite of which openings pass pins 62 surrounded by coil springs 63, the pins being screwed or otherwise fastened in the fixed plate 51 whereby the springs 63 tend to urge the plate 60 toward plate 51. The other two diametrically opposite openings 61 engage over two guide pins 64 which are secured in the plate 51. To manually remove the plate 60 from engagement with plate 51, a handle 65 is provided, and in order to hold the plate 60, when desired, in spaced position from the plate 51 against the pressure of springs 63, the pins 64 adjacent their outer ends are reduced in size and squared on three sides as shown more particularly in Figs. 2, 3 and 7. Since the pins 62 are smaller than the openings 61, this permits a slight lateral movement of the plate 60 when pulled out so that it may engage on the shoulders formed by the squared portions 65' of pins 64 (Figs. 2 and 3).

The movable plate 60 is provided with a slot 66 in registry with the slot 53 of plate 51, and the side walls of the slot are grooved as shown at 67. Adjacent the upper end of the slot 66 a small cross bar 68 is slidably mounted in the

plate by means of tongues 69 engaging the grooves 67 (Figs. 8 and 4). The bar 68 is resiliently urged upwardly by an attached screw 70 against which presses the free end of a spring 71 secured at its other end to the plate (Fig. 4). On the inner face of the bar 68 it is ridged or toothed as shown at 72 (Fig. 5), and this toothed surface in the operation of the machine cooperates with the teeth 45 of the feed dog to grip and feed the roving or other strand. Below the bar 68 and in horizontal alignment with bar 54 is a stationary but adjustable bar 73, which latter is provided with tongues fitting in the grooves 67. In order to adjustably secure the bar 73 in position, it is held to a bar 74 by a screw 75, the bar 74 extending to each side of the slot 66 and being adjustably held to the plate 60 by the slot and screw connections 76 (Fig. 4).

Below the stationary bar 73 is a slidable bar 77 of somewhat greater dimension vertically than the bar 68, and provided with tongues at its ends sliding in the grooves 67. The bar 77 is resiliently urged upwardly by means of an attached screw 78 against which the free end of a spring 79 presses, the other end of the spring being secured to the plate 60 (Fig. 4). The inner face of the bar 77 is ridged or toothed as shown at 80, and this toothed surface in the operation of the machine cooperates with the toothed face 50 of the drafting dog to draft the roving or strand (Fig. 2).

It will be seen that the feed dog 42 and bar 68 form a pair of gripping jaws for feeding the strand, and the drafting dog 47 and bar 77 form a pair of gripping jaws for drafting the strand in conjunction with the feed jaws.

In order to provide for both absolute and relative adjustment of the strokes of the feed dog 42 and drafting dog 47, the following mechanism is provided. Below the rock arms 34 and 35 (see Fig. 2) shafts 81 and 82 extend transversely across the machine, and these shafts may be manually rotated by means of the respective handles 83 and 84. In order to retain the shafts in adjusted position, they are held at one end between the clamps 85 and 86, and clamp screws 87 are used to provide the desired frictional pressure of the clamps on the shafts. On the shaft 81, and in vertical alignment with the rock arm 34, is mounted an eccentric stop 88, and, depending upon the angular position of this eccentric, it varies the extent to which the rock arm 34 and supported feed dog 42 can be downwardly urged by the springs 39 and 40. In a similar manner on the shaft 82 there is mounted an eccentric stop 89 directly below the rock arm 35, so that by varying the position of the eccentric 89 the downward movement of the rock arm 35 and its drafting dog 47 is varied.

The bobbin or bobbins 90 of the strand or strands to be drafted may be mounted on the frame of the machine as shown in Fig. 1, and the rovings or strands passed across the rotating feed bar 30 and then through the guide groove 92 at the top of plate 51 (Fig. 2), after which the strands pass between the guide arms 93, downwardly through the feeding and drafting mechanism, and the drafted strand, in the case where it is to be twisted or spun, may then pass through the pigtail 94 and thence to the ring and traveller 26. The pigtail 94, as shown in Fig. 2, is mounted on a hinged plate 95 which may be thrown upwardly when desired in order to obtain access to the spindle 13.

In use, and referring more particularly to Figs. 2 and 3, the cycle of operation will be considered as starting when the eccentrics 31 and 32 are in a position 90° to the left of that shown in Fig. 2, at which time the dogs 42 and 47 are at their extreme left hand position or retraction, and partially elevated from their lowermost position. As the eccentrics turn clockwise through 90° to the position shown in Fig. 2, they will both advance to the right and further raise the feed dog 42 and drafting dog 47, until as shown in Fig. 2 the two dogs are at their highest positions and are about to grip the roving between themselves and the sliding bars 68 and 77 of the movable plate 60. As the eccentrics make a further turn of 90° clockwise, they are still advancing the dogs 42 and 47 to the right and thereby advancing the plate 60 against the pressure of springs 63. However, due to the elongated slots 33 in which the eccentrics operate, the eccentrics do not in this quarter-turn positively move the dogs 42 and 47 downwardly, but this function is performed by the springs 39 and 40 acting on the rock arms 34 and 35. At the end of this last named 90° movement, the feed and draft dogs are at their farthest point forward or to the right, and in the next 90° movement they retract, while at the same time the springs 39 and 40 continue to urge downwardly the dogs 42 and 47 and along with them the engaged slidable bars 68 and 77.

By the end of this third 90° movement of the eccentrics, the dogs are in the position shown at Fig. 3, in which they are at the bottom of their vertical movement and have been retracted to a point where the spring-returned plate 60 has again engaged the plate 51 and the dogs 42 and 47 are about to release from the bars 68 and 77. As plate 60 engages plate 51, the fibrous strand is caught between and held in place by bars 54 and 73 and is so held until the plates are again separated in the next cycle. In the final 90° revolution of the eccentrics 31 and 32, the dogs 42 and 47 continue to be retracted to their extreme left hand position and at the same time they are being elevated to the above described original starting position.

If the eccentrics 31 and 32 were rotating in exactly fitting circular openings, the feed dog 42 and drafting dog 47 would be positively driven by the eccentrics at all times. However, by the provision of the elongated slots 33 in which the eccentrics operate, the downward movement of the dogs 42 and 47 is accomplished wholly by the combined forces of gravity and the springs 39 and 40. The downward movement of the dog 42 is checked at the proper interval by engagement of its rock arm 34 with the top of the eccentric stop 88 and thereafter the rock arm 34 merely slides rearwardly or forwardly and rearwardly on the face of the eccentric. By adjustment of the eccentric stop 88, the amplitude of the downward movement or throw of the feed dog can thus be regulated to suit, the amplitude usually being such that downward movement of the dog 42 is stopped before the dog has reached the limit of its travel to the right. In a similar manner the amplitude of the downward throw of the draft dog 47 is regulated by the eccentric stop 89 against which the bottom of the rock arm 35 engages in the downward movement of the drafting dog. The amplitude of the downward throw of dog 47, may be such that dog 47 is stopped at the desired point in the downward rotation of eccentric 32. Thus, by proper adjustment of the eccentric stops, the absolute downward movement of the feed and draft dogs may be regulated, as well as

their relative movement. The adjustment will be such that the draft dog will have a greater throw than the feed dog, and thus the roving 91 will be drafted by virtue of this difference in the amplitudes of the working strokes of the feed and draft dogs, the draft dog extending and thinning out a small portion of the roving lying between the point where the draft dog grips the roving and the point where the feed dog grips the latter after the initial simultaneous downward movement of both dogs has first advanced the roving as an entirety.

A great advantage in this construction lies in the obviation or great reduction of strain on the fibers in the drafting operation. In the usual form of drafting apparatus employing differential-speed pairs of rolls, as a fiber is fed through the rear pair of rolls and its forward end comes into the bite of the front or drafting pair of rolls, the fiber is immediately seized and drawn forward at the maximum peripheral speed of the front rolls, thus entailing great and sudden strain on the fiber and tending to break it. On the other hand, by the present method and apparatus, the feed and draft dogs engage the roving or strand when substantially at or adjacent the top of their upward movement, so that the fibers are engaged by the dogs while the vertical components of the motion of the latter are at a minimum or are substantially zero, which is very desirable for even drafting and making a level yarn.

When the dogs 42 and 47 release the roving from the position shown in Fig. 3, the sliding bars 68 and 77 are released and returned to their top positions by the respective springs 71 and 79, and the drafted roving, in the case where it is twisted as by a ring spinning frame, will tend to assume twist running back from the traveller, and this twist would, of course, extend back into the undrafted portion of the roving if not controlled. To prevent this, the stationary bars 54 and 73 are provided in the respective plates 51 and 60. Whenever the plate 60 is being pressed against the plate 51, the bar 73 is being pressed against the bar 54, and therefore at this time the two bars will grip the roving between them and prevent twist in the drafted portion from passing beyond their point of contact. However, it will be noted that since the bars 54 and 73 are located above the draft dog 47, the twist in the drafted roving can travel slightly above the draft dog when the latter is free from engagement with the bar 77, so that during a succeeding drafting operation there is substantial twist in the lower end of the small portion of roving which is being drafted, and this aids in the drafting operation by gathering up or condensing into a cone the portion being drafted. The draft dog 47 therefore engages the strand at a portion which has already been twisted, and the drafting force is transmitted through the uppermost twisted portion to the conical non-twisted portion which is to be drafted.

If desired, one or more additional drafting dogs may be employed below the dog 47, so that the drafting of a roving may take place in a plurality of successive steps.

The roughening of plate 51 at 53' is to provide a better grip on the roving and prevent backward slippage between drafting impulses, and the roughening of stationary bar 54 at 59 aids in preventing twist from running back.

A further advantage in the construction of the present apparatus is that there is no hindrance to setting the positions of the feed and draft dogs, at the beginning of their working strokes, as close together as may be required for the drafting of any staple fibers however short. For example, it is feasible to draft and twist into yarn even the shortest spinning grades of asbestos fiber, that is, those grades which contain only about 50% of fibers which will be retained on a screen having four meshes per inch and no fibers of one-half inch length or longer. Likewise, low grades of cotton may be spun without difficulty.

The method and apparatus are of course capable of drafting any staple length asbestos fiber, but they are particularly applicable for drafting short fibers which cannot be drafted by the usual draft rolls without the inclusion of an undesirable amount of longer staple fiber such as cotton.

The invention is equally applicable for the drafting of cotton and other fibers, and when used with cotton fibers, it is capable of producing a very soft yarn of high quality having characteristics similar to yarn produced by mule spinning, and at the same time the yarn is produced with a speed of operation comparable with that of ring spinning.

While it is preferable to provide the resiliently operable movable plate 60 with the sliding bars 68 and 77 for engagement with the feed and draft dogs, this construction is not essential, and good results have been obtained by the use of a solid or imperforate plate in place of the plate 60. The feed and draft dogs in this case move the roving across the inner solid smooth face of the plate. It is also obvious that any equivalent drafting means, or equivalent driving and adjusting means for the feed and draft dogs may be employed. It is also not essential that the feed of the strand be intermittent, as a slow continuous feed may be employed.

It will be seen that in operation the feed dog 42, in cooperation with the bar 68, intermittently feeds forward a small portion of the strand or roving, and that the draft dog 47, in cooperation with the bar or plate 77, intermittently drafts or elongates a portion of strand previously fed by the feed dog. The intermittent advance of the drafted and twisted strand is found to have no visible effect on the resulting yarn or on the operation of the twisting mechanism.

As before pointed out, the drafting may be carried out by the use of a single strand or roving, but it is preferable, as shown in Fig. 1, to provide a plurality of strands or rovings and draft them into a single strand, as by this procedure and using a correspondingly increased draft, a more uniform yarn can be obtained than in the case where a single strand is drafted at a less degree of draft, and at the same time the occurrence of "ends down" or breaks is greatly reduced.

While the method and apparatus are successful in a high degree with the use of a dry strand or roving, if desired the roving may be moistened or wet, with or without the use of so-called "wetting agents", and this produces a somewhat more compact and harder yarn.

It will be seen that by the invention a greatly improved apparatus and method are provided for drafting all kinds of textile fibers, and that in particular the invention provides means for intermittently drafting very short asbestos or other fibers of a character which could not be drafted by the commonly employed drafting rolls and processes. At the same time the yarn produced is more uniform, that is, it has fewer thick and thin places, and it can be made in very fine sizes.

While a specific embodiment of the invention has been shown and described, it is obvious that

numerous modifications may be made therein, and it is not desired to limit the invention otherwise than as set forth in the appended claims and as required by the prior art.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. The method of treating textile fibers which comprises intermittently feeding, and alternately therewith drafting successive distinct small portions of a strand of fibers while the strand is acted upon by the intermittently feeding means, and simultaneously therewith twisting the drafted strand.

2. The method of treating textile fibers which comprises drafting a strand of fibers by intermittently extending and thinning successive small portions of the strand, the rate of extension for each portion increasing from a minimum to a maximum speed.

3. The method of treating textile fibers which comprises feeding a strand of fibers, and drafting the strand by intermittently extending and thinning successive small portions thereof, the rate of extension of each portion starting at substantially zero speed and increasing to a maximum.

4. The method of treating textile fibers which comprises feeding a strand of fibers, drafting the strand by extending and thinning successive small portions at a rate of extension which increases from a minimum to a maximum, and twisting the drafted strand.

5. The method of treating textile fibers which comprises intermittently feeding successive small portions of a strand of loosely aggregated fibers, alternately with the feeding of each portion drafting a previously fed portion while acted upon by the intermittently feeding means, and imparting twist to at least a part of each fed portion prior to its drafting.

6. The method of treating textile fibers which comprises feeding a strand of fibers, intermittently drafting successive small portions of the fed strand by gripping and drawing out each such portion from one end while similarly gripping and holding its opposite end, and twisting the drafted strand.

7. The method of treating textile fibers which comprises feeding a strand of fibers, and applying successive independent step by step drafting impulses to successive overlapping small portions of the fed strand.

8. The method of treating textile fibers which comprises intermittently feeding a strand of fibers, and applying successive independent step by step drafting impulses to successive overlapping small portions of the fed strand.

9. The method of treating textile fibers which comprises feeding successive distinct small increments of a strand of fibers, applying successive independent drafting impulses to successive overlapping small portions of the fed strand, and simultaneously twisting the drafted strand.

10. The method of treating textile fibers which comprises gripping and feeding at intervals successive small increments of a strand of fibers, and following successive feeding movements applying drafting impulses to small portions of the fed strand while the latter is gripped by the at intervals feeding means.

11. The method of treating textile fibers which comprises intermittently applying a feeding movement to successive and distinct small portions of a strand of fibers, and, closely following such feeding movements, applying successive drafting impulses to successive overlapping small portions of fed strand while the strand is acted upon by the feeding means.

12. The method of treating textile fibers which comprises intermittently gripping a strand of fibers and feeding successive small portions of the strand, and, closely following each feeding movement, attenuating a small portion of the fed strand disposed immediately beyond the gripping point.

13. The method of treating textile fibers which comprises intermittently gripping and feeding a strand of fibers, applying intermittent drafting impulses to small portions of the fed strand, twisting the drafted strand while it is gripped by the intermittently feeding means, and intermittently extending twist to the portions of strand being drafted.

14. The method of treating textile fibers which comprises intermittently gripping and feeding successive small portions of a strand of loosely aggregated fibers, intermittently drafting such portions by successively drawing out each from one end while holding its other end by the gripping means, and twisting the drafted strand.

15. A textile fiber treating mechanism comprising a plurality of means for gripping a strand of loosely aggregated fibers at spaced points, and means for bodily moving said gripping means, one of said gripping means having a movement of greater amplitude, whereby said strand may be drafted.

16. A textile fiber treating mechanism comprising spaced pairs of means for gripping a strand of loosely aggregated fibers, means for contemporaneously reciprocating said pairs of gripping means and including means for imparting a movement of greater amplitude to one pair than the other, to thereby feed and draft the strand, and means for twisting the strand.

17. A textile fiber treating mechanism comprising a plurality of means for yieldingly gripping a strand of loosely aggregated fibers at spaced points, means for bodily moving said gripping means different distances while in engagement with the strand, and means for twisting the strand.

18. A textile fiber treating mechanism comprising a plurality of means for gripping a strand of loosely aggregated fibers at spaced points, means for varying said spacing, means for bodily moving said gripping means, the amplitude of movement of one of said gripping means being greater, and means for twisting the strand.

19. A textile fiber treating mechanism comprising a plurality of means for gripping a strand of loosely aggregated fibers at spaced points, means for bodily moving said gripping means different distances while in engagement with the strand, means for varying the difference in distance, and means for twisting the strand.

20. A textile fiber treating mechanism comprising a plurality of means for gripping a strand of loosely aggregated fibers at spaced points, means for bodily moving said gripping means different distances while in engagement with the strand, means for varying the distance moved by each gripping means, and means for twisting the strand.

21. A textile fiber treating mechanism comprising a plurality of means for gripping a strand of loosely aggregated fibers at spaced points, means for varying said spacing, means for bodily moving said gripping means different distances while in engagement with the strand, means for

varying the difference in distance, and means for twisting the strand.

22. A textile fiber treating mechanism comprising means for intermittently feeding successive small portions of a strand of loosely aggregated fibers, and means cooperating with said feed means and linearly movable relatively thereto for intermittently drafting successive small portions of the fed strand, said drafting means being operated at a speed gradually increasing to a maximum.

23. A textile fiber treating mechanism comprising means for intermittently feeding successive small portions of a strand of loosely aggregated fibers, drafting means for gripping a previously fed portion of the strand, and means for intermittently bodily moving said drafting means at a speed gradually increasing to a maximum and relatively to the feed means, and means for twisting the drafted strand.

24. A textile fiber treating mechanism comprising feed means for gripping a strand of fibers, means for intermittently moving said feed means at a speed gradually increasing to a maximum, to thereby feed successive small portions of the strand, drafting means for gripping a previously fed portion of said strand, means for intermittently bodily moving said drafting means at a speed gradually increasing to a maximum and relatively to the feed means, to thereby draft the strand, and means for twisting the strand.

25. A textile fiber treating mechanism comprising feed means for gripping a strand of fibers, drafting means for gripping the strand in spaced relation to the feed means, and means for synchronously and intermittently imparting a reciprocatory movement to said feed and drafting means and including means for imparting a movement of greater amplitude to the drafting means.

26. A textile fiber treating mechanism comprising spaced feeding and drafting means for engaging a strand of fibers, means for intermittently imparting to the feeding means a movement in a direction linearly of the strand and contemporaneously therewith a movement to the drafting means also in a direction linearly of the strand but of greater amplitude, and means for twisting the strand.

27. A textile fiber treating mechanism comprising a resiliently engaging set of jaws for gripping a strand of fibers, a second set of resiliently engaging jaws for gripping said strand in spaced relation to said first jaws, means for intermittently imparting a to and fro movement of small amplitude to said first set of jaws and contemporaneously therewith a similar movement of greater amplitude to the second set of jaws, and means for twisting the strand.

28. A textile fiber treating mechanism comprising means for intermittently engaging and feeding successive small portions of a strand of fibers, and means for contemporaneously intermittently engaging and drafting a previously fed portion, at least one of said means including a strand gripping jaw movable laterally to the strand into and out of gripping engagement therewith.

29. A textile fiber treating mechanism comprising means for intermittently engaging and feeding successive small portions of a strand of fibers, means relatively bodily movable to said feeding means for contemporaneously intermittently engaging and drafting a previously fed portion, and means for twisting the strand.

30. A textile fiber treating mechanism comprising means for intermittently engaging and feeding successive small portions of a strand of fibers, means for contemporaneously intermittently engaging and drafting a previously fed portion, means intermediate the feeding and drafting means for engaging the strand during the inoperative portions of the cycles of the feeding and drafting means, and means for twisting the strand.

31. A textile fiber treating mechanism comprising means for intermittently engaging and feeding successive small portions of a strand of fibers, means for contemporaneously intermittently engaging and drafting a previously fed portion, means for twisting the drafted strand, and means for limiting rearward extension of the twist in the strand during non-engaging periods of said feeding and drafting means.

32. A textile fiber treating mechanism comprising means for intermittently engaging and feeding successive small portions of a strand of fibers, means for contemporaneously intermittently engaging and drafting a previously fed portion, an adjustable strand engaging means disposed intermediate the feeding and drafting means and operable to engage the strand when the feeding and drafting means are out of engagement with the strand, and means for twisting the strand.

33. A textile fiber treating mechanism comprising a fixed slotted plate, a cooperating plate resiliently held against said first plate, spaced feed and draft members aligned with said slot, drive means for imparting reciprocatory movement both perpendicular to said plates and longitudinally of said slot to each of said members, with a greater amplitude of movement to said draft member longitudinally of said slot, means for delivering a strand of loosely aggregated fibers between said plates and longitudinally of said slot, a twisting mechanism for the drafted strand, and an adjustable bar mounted in said slotted plate across said slot between said feed and draft members.

34. A textile fiber treating mechanism comprising resiliently pressed together plates having aligned slots, spaced cross bars slidably mounted in one of said slots and resiliently urged in one direction, a stationary adjustable cross bar mounted between said first named cross bars, a stationary adjustable cross bar mounted in the other slot in registry with said first named stationary bar, a feed member movable through said other slot into interengagement with one of said slidable bars, a drafting member movable through said other slot into interengagement with another of said slidable bars, means for imparting movements longitudinally of said slots and of different amplitudes to said feed and drafting members while in engagement with said slidable cross bars, means for directing a loosely aggregated strand of fibers between said plates in alignment with said slots, and means for twisting said strand.

35. A textile fiber treating mechanism comprising a pair of movable feed members adapted to interengage and feed a strand of fibers step by step, positive means for moving one of said members forwardly, upwardly and rearwardly, resilient means for moving said member downwardly, resilient means for resisting forward and downward movement of the other feed member, a pair of movable drafting members adapted to interengage and longitudinally extend a portion of

the strand between themselves and the feed members, positive means for moving one of said drafting members forwardly, upwardly and rearwardly, resilient means for moving said drafting member downwardly, resilient means for resisting downward movement of the other drafting member, adjustable means for securing a downward movement of said feed members less than that of the drafting members, and means for twisting the strand.

36. A textile fiber treating mechanism comprising a pair of resiliently interengageable strand feed members, means for intermittently engaging them, resilient means for imparting a feed movement to the engaged members, a pair of resiliently interengageable strand drafting members, means for intermittently engaging them simultaneously with the feed members, resilient means for imparting a drafting movement to the engaged drafting members, adjustable means for limiting said feed and drafting movements, and means for twisting the strand.

37. A textile fiber treating mechanism comprising a feed member having intermittent strand engaging and feeding movements, a drafting member having intermittent strand engaging and drafting movements, means for imparting said movements, means for varying the amplitudes of said feeding and drafting movements both absolutely and relatively to each other, and means for twisting the strand.

38. A textile fiber treating mechanism comprising a feed member having intermittent strand engaging and feeding movements, a drafting member having intermittent strand engaging and drafting movements, means for contemporaneously imparting said movements, means resiliently cooperating with said feeding and drafting members to grip the strand during said feeding and drafting movements, means for varying the amplitudes of said feeding and drafting movements both absolutely and relatively to each other, a ring spinner for twisting the drafted strand, and means intermediate the feeding and drafting members for limiting retrograde twist of the strand.

39. A textile fiber treating mechanism comprising feeding means having intermittent strand engaging and feeding movements, drafting means having intermittent strand engaging and drafting movements, and means for simultaneously initiating movement of said feeding and drafting means and imparting a movement of greater amplitude to the drafting means.

40. A textile fiber treating mechanism comprising means for feeding a strand of fibers, means spaced therefrom for intermittently applying drafting impulses to a portion of strand between said two means, and each of said means including a strand gripping jaw movable laterally to the strand into and out of gripping engagement therewith.

41. A textile fiber treating mechanism comprising means for feeding a strand of fibers, means spaced therefrom for intermittently applying drafting impulses to a portion of strand between said two means, and each of said means including a pair of cooperating jaws adapted to remain in fixed relation to the strand gripped therebetween during the drafting operation.

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