July 8, 1941. N. S. CAMPBELL 2,248,806

METHOD AND APPARATUS FOR FORMING STAPLE FIBER

Filed May 29, 1937 2 Sheets-Sheet 1

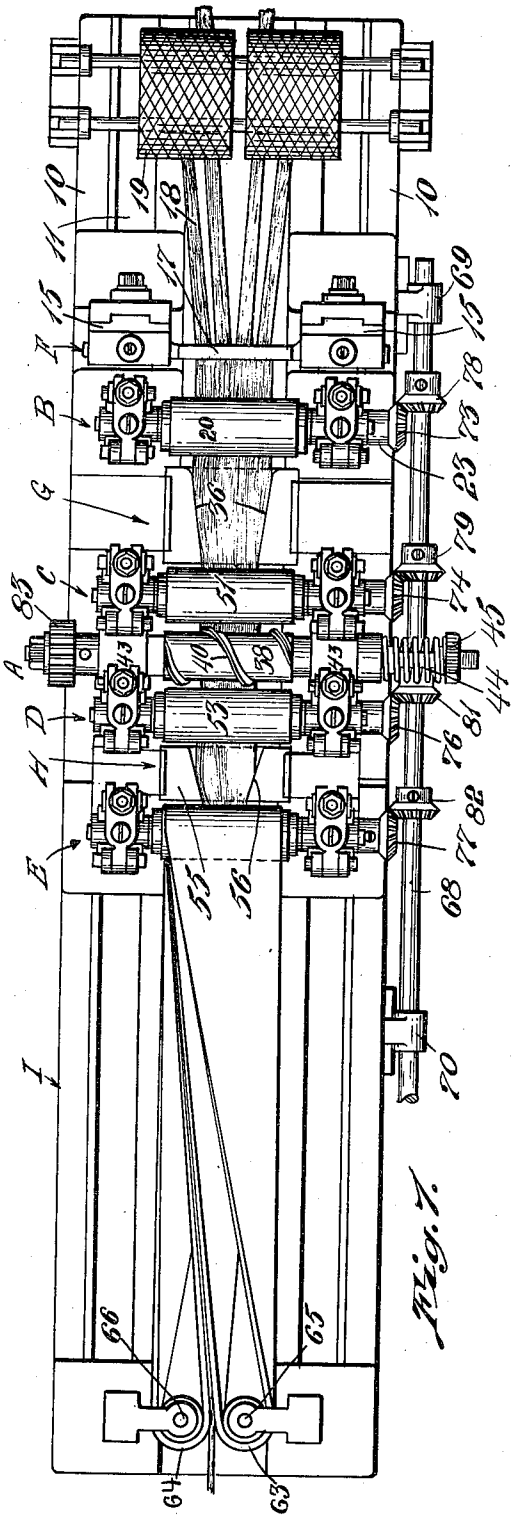


Fig. 1.

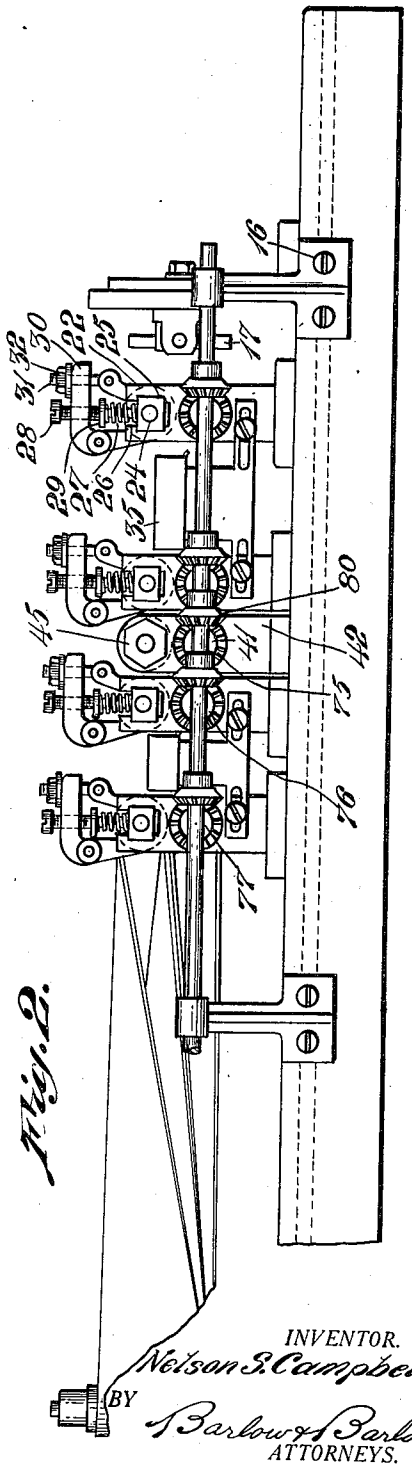


Fig. 2.

INVENTOR.
Nelson S. Campbell
BY
Barlow & Barlow
ATTORNEYS.

July 8, 1941. N. S. CAMPBELL 2,248,806

METHOD AND APPARATUS FOR FORMING STAPLE FIBER

Filed May 29, 1937 2 Sheets-Sheet 2

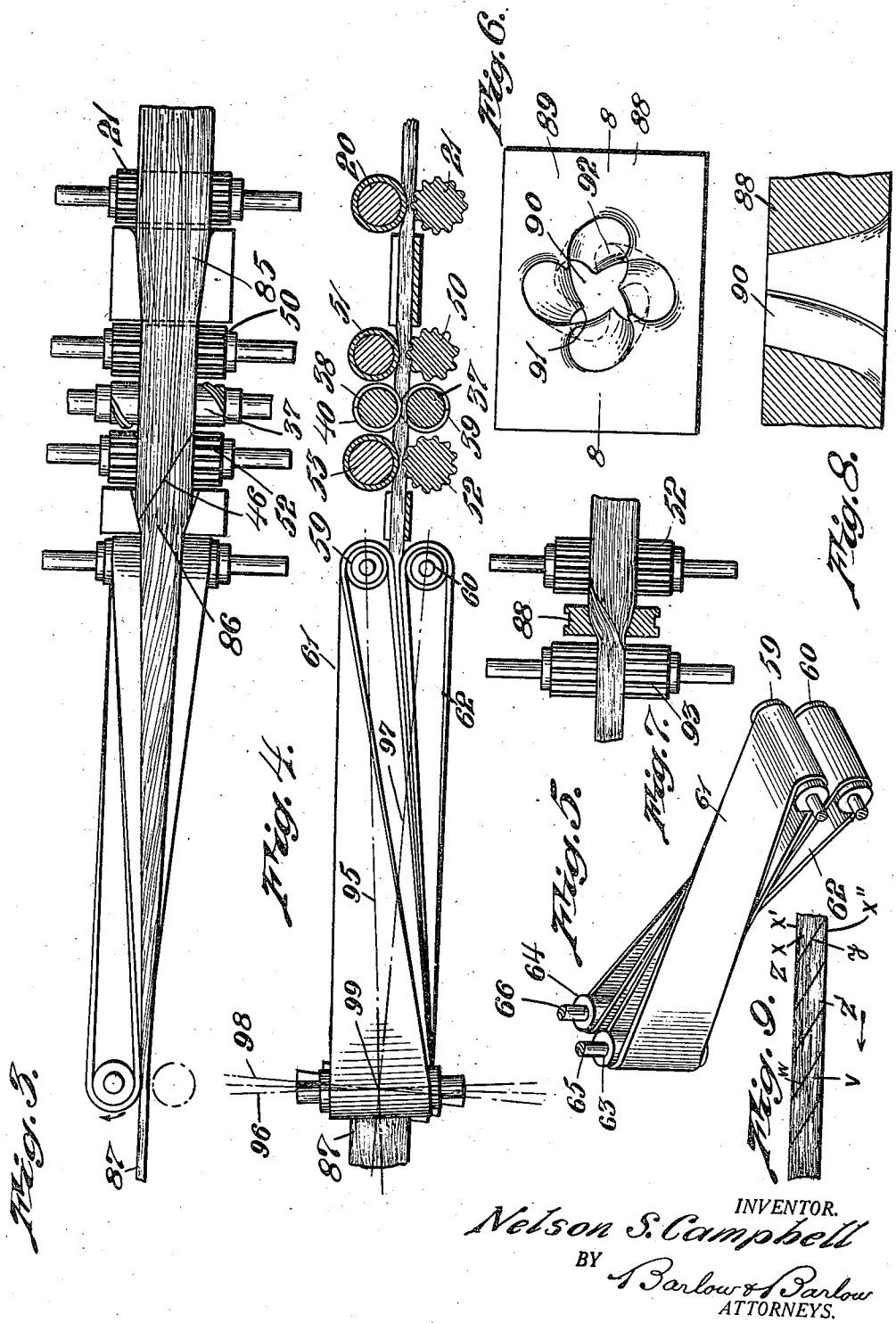


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

INVENTOR.
Nelson S. Campbell
BY
Barlow & Barlow
ATTORNEYS.

Patented July 8, 1941 2,248,806

UNITED STATES PATENT OFFICE

2,248,806

METHOD AND APPARATUS FOR FORMING STAPLE FIBER

Nelson S. Campbell, Brookline, Mass.

Application May 29, 1937, Serial No. 145,425

24 Claims. (Cl. 19—1)

This invention is a continuation in part of my co-pending application, Ser. No. 62,418, filed February 5, 1936, and relates to the method and apparatus for handling a group or large number of filaments somewhat similar to the usual sliver except that these filaments are in the form which is commonly called "continuous filaments." For convenience in the following description, I will call this large number or group of continuous filaments a "rope" although it is not twisted. The filaments will be either natural, such as silk, or artificial which at the present time are often referred to as synthetic filaments such for example as rayon, Celanese, Bemberg, or any others which may hereafter be developed.

This invention has for one of its objects the converting of such continuous filaments into workable or draftable sliver.

Another object of the invention is the maintaining of the filaments and fibers after being cut into staple length in a substantially undisturbed parallel relation so that it will be unnecessary to employ a carding, combing or straightening out operation on the staple fibers with a consequent damage to the individual fibers and waste of the material.

Another object of the invention is the simplifying of the process of converting continuous length fibers into spinnable length fibers by the elimination of one or more of the steps which it is customary to employ and thus causing a saving in both the machinery and labor in the final result acquired.

Another object of the invention is the continuous moving of the work through the machine as distinguished from intermittent feeding and thus a more simplified machine and process for the feeding of the work than where step-by-step feed mechanism is necessarily employed.

Another object of the invention is to cut the fibers with a knife and after the fibers are so cut to turn the work so that the fibers are related one overlying the other in a vertical direction instead of one extending past the end of the other in a horizontal plane.

Another object of the invention is to carry the work through the apparatus with the minimum amount of friction on the work and without pushing the work while performing the desired functions on the same.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a top plan view illustrating somewhat diagrammatically a machine for accomplishing the principles of my invention;

Fig. 2 is a side elevation of this apparatus;

Fig. 3 is a top plan diagrammatic view illustrating the mechanism above the work as removed and showing the work as passing through the operations of the apparatus;

Fig. 4 is a diagrammatic side elevation showing the work as it would appear from the edge thereof;

Fig. 5 is a perspective view of the pair of traveling belts which receive and turn the work so as to dispose it at right angles to the plane of its travel through the feeding rolls and cutters;

Fig. 6 is an end view of a condensing block which may be interposed between the cutting rolls and the delivery rolls of the apparatus for turning the work about its axis through 90° and which may be substituted for the belts for handling certain sorts of work;

Fig. 7 is a diagrammatic view showing the block of Fig. 6 in section and illustrating the work as being turned through 90°;

Fig. 8 is a central sectional view of the block on line 8—8 of Fig. 6;

Fig. 9 is a top plan view of the sliver after it has been cut into staple length fibers and showing the relation of the fibers one to the other.

Heretofore, it has been usual to cut continuous length filaments into staple fibers in such a manner that it was necessary to pass the staple fibers through a carding machine in order to straighten out the fibers and arrange them in parallel relation, or it has been attempted to break continuous length filaments into staple fibers, but it has been found that the break will not occur sufficiently evenly along the length of the filament but rather the staple fibers are of such uneven length as to be unserviceable for high-grade sliver where predetermined even lengths of fibers are required. Then again in pulling fibers until they break, these fibers are caused to stretch which is injurious to the fibers and accordingly not entirely satisfactory; and in order that these detrimental results may be eliminated, I have provided a machine in which the work is fed continuously through the machine, a knife operating obliquely to the line of travel of the work plane is caused to sever the fibers and these fibers are maintained in a generally parallel direction and manipulated so that they are in draftable form whereby they may be directly put into a drawing apparatus or be ready to be later put into a drafting apparatus for drawing the sliver without the

necessity of passing the same through a card to straighten the staple fiber, thereby eliminating a great deal of waste and breaking of the fiber which has heretofore been occasioned, the same being accomplished with a minimum amount of friction and accordingly a minimum amount of tendency to break the fiber as it is passed through the apparatus; and the following is a more detailed description of the present embodiment of this invention, illustrating the preferred means by which these advantageous results may be accomplished:

I will first point out that my machine consists essentially of a means for feeding the work to and through the machine from a suitable source of supply, a means for cutting the work on an oblique or diagonal to the path of travel of the work through the machine and a re-arranging of the fibers for presenting them to a drafting apparatus, all of which can be utilized as an attachment to a gill box or a drawing frame when delivering the work in the required form thereto.

The general plan of this invention is to assemble a group of continuous filaments in the form of ropes, as above explained, side by side so that the width is greater than the thickness similar to the form of a ribbon, and to then cut the ribbon diagonally of its path of travel through the machine, as shown in Fig. 9, to form sections of staple fibers so arranged that the end portions of some of the staple fibers of the section will overlap the opposite end portions of other relatively laterally disposed staple fibers, the cut being made generally in a vertical plane for this purpose, and from top to bottom of the ribbon. The sections of staple fibers are designated generally *z*, while the diagonal line of cut separating them is designated generally *y*, looking down on top of the ribbon shown in Fig. 9, while each individual staple fiber is designated *x*. The fibers at one edge of the section are denoted *x'* and at the other edge of the section *x''*. The end portion *w* of the fibers *x'* of one section *z* extend forwardly past the ends *v* of the fibers of the next section *z* which are laterally disposed with reference to the fibers at the opposite edge of the block or section. In fact, the end *v* of the fiber on the edge *x'* of the section *z* is in substantially the same position as the fiber *x''* on the extreme opposite edge of the next section *z*, so far as advancement in the direction of the arrow is concerned, while each of the intermediate fibers between the edges bear a similar relation, so far as the position of advancement is concerned, in the direction of the arrow of one extending along a portion of another in what I term an overlapping relation; and then I rotate or turn the ribbon of material which is disposed generally in a horizontal plane through 90° or a quarter turn so as to dispose the work in a generally vertical plane, this rotation occurring after the cut has been made so that the overlapping portions of the staple fibers instead of overlapping at each side of a vertical plane overlap from top to bottom of the work after it has been rotated which permits the staple fibers to be drawn in a drawing apparatus, it being delivered to a gill box or any drawing apparatus for this purpose.

The apparatus for accomplishing this result comprises generally the provision of a cutting means, a means for feeding the work through the cutting means, and a means for positioning the work with reference to the cutting means and with relation to its next operation of drawing. These different operations are performed by different units, there being several units for positioning the work and several units for feeding the work. The cutting unit is designated generally A, the feeding means consist of units designated generally B, C, D and E, while the positioning means are designated as units F, G, H and I, the latter unit serving to turn the work through 90° and also including as a part of its operative structure the feeding unit E. The positioning means locate the work definitely and hold it against lateral movement while also exercising some condensing action on the work as it is passed through the machine.

With reference more particularly to Figs. 1 and 2, numeral **10** designates the frame of the apparatus consisting of spaced parallel tracks having undercut grooves **11** for receiving and supporting standards carrying different parts of the actuating mechanism for operating upon or guiding the work. The reed F comprises standards **15** mounted on the tracks **10** and held in desired position by bolts **16** for supporting between these standards a plate-like member **17** having a plurality of openings therein for the reception of various ropes **18** which are drawn from suitable twenty pound balls **19**, shown as much smaller in proportion to their original size than the remainder of the apparatus, and supported at some point spaced from the end of the machine for positively locating and positioning these ropes with reference to the actuating mechanism of the apparatus. Each of these ropes, as before mentioned, consists of a group of filaments each of a continuous length, that is, filaments which may extend up to a thousand yards or so and of any convenient length such as may be drawn from a spinneret and packaged in a single ball or top **19**.

After passing through the reed plate **17**, the work is engaged by the first feeding unit B of the series B, C, D and E. These feed units are all similar, thus a description of one or the first unit will suffice. In the first feed unit the upper pressure roll is designated **20** and the lower fluted driven roll **21**. These rolls are supported in standards **22** adjustably positioned on the frame of the machine **10**. The lower driven roll is mounted on shaft **23** which has bearings in the support **22**, while the upper roll is mounted upon shaft **24** having bearings **25** which are slidable in guides **26** in the standards **22**, and these bearings are pressed downwardly by means of springs **27** encircling bolt **28** and acting between the bearing **25** and the abutment washer **29** on bolt **28**. This bolt is carried by arm **30** which is held in position by a rockable bolt **31** and its nut **32**.

After passing through feed unit B the work is guided by unit G comprising a trough-shaped device **35** having side walls **36** converging toward each other in the direction of the advancing work as it travels in the machine, which causes a condensing of the work prior to being fed by rolls **50** and **51** of unit C, which is similar to the unit B above described, into the cutters A, which consists of a pair of cylindrical members **37** and **38** with helically disposed cutting ribs **39** and **40** thereon. The lower cylindrical cutter is rotatably mounted in bearings **41** in the standard **42** while the upper cutter **38** is rotatably mounted in bearings **43** in the standard **42**. This upper cylinder is axially urged by reason of a spring **44** adjustable by the nut **45** so as to cause the cutting edges of the ribs **39** and **40** to contact and pass each other with a shearing action. The cylinder portion of the cutters grip and feed the mass of work and prevent it from lateral movement, and as

the work is passed through these cutters a diagonal cut such as 46 is performed severing the group of fibers. The angular relation of the helices on the drums will depend upon the width of the work being fed through the machine and the length of staple fiber required. The cutting cylinders such as illustrated, for example, are substantially five inches in circumference, thus adapting them to cut staple fibers five inches in length. The axial length of each cylinder is substantially four inches and the helical cutting rib extends substantially twice about each cylinder in this four-inch length. The work is substantially two inches in width and located in the middle of the cylinder so that two inches of the helical cutter engages this two inches of work. It is found that this example of dimensions is a correct proportioning of these parts to provide the correct angle or pitch of the cutting helix or rib so as to provide the proper overlap of the staple fibers and yet provide an angular cut which will not cause too great a side push or tendency to move laterally, the same being held by the grip of the cutting cylinders on the fibers. If a staple fiber of a different length is to be desired, a different diameter of cutting cylinder will be provided, the diameter of the cutting cylinder being the criterion of the length of fiber which is to be formed. It will, however, be readily apparent that this is merely a mathematical problem which may be readily solved for the dimensions required.

After leaving the cutters A the work is fed by unit D which is similar to unit B and equipped with rolls 52 and 53. After delivery from the rolls 52 and 53 of unit D the work is further condensed by means of the unit H comprising the trough 55 having the inclined walls 56 converging in the direction of travel of the work. After this condensing the work enters the turning device I which comprises a pair of belts which travel over rolls in unit E similar to unit B. These belts are much longer in proportion to their roll than shown, the shorter length being more convenient for illustration. The rolls in unit E are designated 59 and 60 and rotate on substantially parallel axes and about which endless belts 61 and 62 travel. These belts also travel about pulleys 63 and 64, as shown in various figures, but particularly clearly in Figs. 4 and 5, which pulleys are mounted on shafts 65 and 66. These shafts are disposed generally at right angles to the shafts of the rolls 59 and 60 but the shafts 65 and 66 are not parallel to each other. For instance, the axis of the shaft 65 is in a plane 96 which is perpendicular to the line 95 drawn from the axis of the roll 59 at a point midway between its opposite edges and passing through a point midway between the opposite edges of the roll 63. The similar plane passing through the axis of shaft 66 is designated 98, which plane is perpendicular to the line 97 drawn from the axis of the roll 60 at a point midway between its opposite edges to a point on the axis of the roll 66 which is midway between its edges. The intersection of the planes 96 and 98 will form a line 99 which will pass not only through the points of intersection of the line 95 with the plane 96 and the point of intersection of the line 97 with the plane 98, but also will pass through the center of the work. It is necessary that this angular relation of the shafts 65 and 66 be maintained in order that the belts will maintain their correctly disposed relation, such as shown in Fig. 5. This same relationship applies to the rolls 59 and 60 at the other end of the belts. Thus, it will be apparent that the work which is fed into the belts in the form of a flat thin ribbon in a horizontal plane will be rotated or turned through a quarter of a revolution or through 90° by being gripped by the surfaces of the belt and gradually turned through this amount before discharged, so that instead of being in a generally horizontal plane as at its feeding end the work will be in a generally vertical plane when delivered from the apparatus or at right angles to its position of travel through the remainder of the machine. This disposes the obliquely cut ends which are overlapping in a sidewise direction to a position so that the ends of the fibers are overlapping from the bottom to the top and thus are in a position to be drawn in the drafting apparatus.

A drive shaft 68 extends horizontally along the length of the apparatus being mounted in bearings 69 and 70 to which shaft power is applied from the gill box or other drawing apparatus to which the apparatus is applied. Bevel gears are provided on the ends of the lower rolls 21, 50, 52 and 60 and also on the end of the cutter shaft 37, which gears are designated respectively 73, 74, 76, 77 and 75, respectively, to be driven by the bevel gears 78, 79, 81, 82 and 80, respectively, fixed on the shaft 68. In order that the cutters may be driven in unison spur gears 83 are on the ends of each of the shafts of the cutters which mesh with each other.

The work 18 as it is fed into the machine is condensed as at 85, severed as at 46 and again condensed as at 86, whereupon it passes into the belts and is turned through 90° to be delivered at right angles to its position operated upon. The condensing means as at 85 and 86 are substantially the only points of friction in the passage of the work through the machine, there being substantially no friction by means of the belts gripping the work as it is traveled through and turned in this form of the apparatus. A tension is maintained on the work by reason of a slightly different diameter of the feed rolls, the diameter of the rolls slightly increasing as the work progresses through the machine, or if desired, the gears on the ends of the rolls or feeding members may be arranged to cause this tension to exist, thus the fibers at no time are pushed in their travel.

It is desirable under some circumstances to provide a combined condenser and turning device for the work, and I have illustrated at 88 in Fig. 6 such a device. This device consists of a fixed block 89 having an opening 90 through it with ribs 91 which are directed along the path of a helix. These ribs are rounded at their edge but provide lobes 92 between them for the reception of the work so that the ribs extend into the work sufficiently to act upon the same and cause the work to follow the path of the ribs, thus causing the advancing work to turn through an angular relation dependent upon the extent of the ribs with a slight allowance for slippage, thus, to produce a turn of substantially 90° as it passes through the opening 90. I cause the ribs to be disposed through substantially 100° by reason of the axial dimension of the fixed block 89. A plating of chromium covers the work contacting surface of the orifice and ribs and is highly polished to present a minimum amount of friction on the work traveling therethrough. In such a disposition of the work the pulleys 59 and 60 act as feed rolls rather than pulleys and the surface 93 of the lower roll is fluted in order that a grip will be

had upon the work to deliver it to the gills of a drawing apparatus.

The foregoing description is directed towards the method and construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the equivalent changes to which the construction and method are susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. The process of forming spinnable sliver from filaments of continuous lengths, which comprises continuously feeding said filaments in generally parallel contiguous relation in a lengthwise direction, cutting said filaments obliquely to their line of travel while moving to provide staple fibers, turning the mass of fibers about an axis parallel to the direction of travel of the work to dispose said cut in a different plane and feeding said staple fibers to a drawing apparatus while maintaining the fibers in substantially parallel position.

2. The process of forming spinnable sliver from filaments of continuous lengths which comprises continuously feeding said filaments in generally parallel contiguous relation in a lengthwise direction, cutting said filaments obliquely to their line of travel while moving to provide staple fibers overlapping each other at right angles to the plane of cut, turning the mass of fibers through substantially 90° to dispose the plane of said cut ends one overlying the other from top to bottom, and feeding said fibers to a drawing apparatus having superimposed rolls while maintaining the fibers in substantially parallel position.

3. The process of forming spinnable sliver from filaments of continuous lengths, which comprises continuously feeding said filaments in generally parallel contiguous relation in a lengthwise direction, cutting said filaments obliquely to their line of travel while moving to provide staple fibers, turning the mass of fibers through substantially 90° to dispose said cut in a different plane and feeding said staple fibers to a drawing apparatus while maintaining said staple fibers in a substantially parallel position.

4. The process of forming spinnable sliver from filaments of continuous lengths which comprises continuously feeding said filaments in generally parallel contiguous relation in a lengthwise direction, cutting said filaments obliquely to their line of travel while moving to provide staple fibers overlapping each other at right angles to their plane of cut, turning the mass of fibers about an axis parallel to the direction of travel of the work through substantially 90° to dispose the plane of said cut ends one overlying the other from top to bottom and feeding said fibers to a drawing apparatus having superimposed rolls, while maintaining said staple fibers in a substantially parallel position without combing.

5. The process of forming spinnable sliver from filaments of continuous lengths which comprises continuously feeding said filaments in generally parallel contiguous relation in a lengthwise direction, cutting said filaments obliquely to their line of travel while moving to provide staple fibers overlapping each other at right angles to the plane of cut, condensing said staple fibers into a more compact mass, maintaining the fibers in a substantially parallel position, turning the mass of fibers through substantially 90° to dispose the plane of said cut ends one overlying the other from top to bottom and feeding said fibers to a drawing apparatus having superimposed rolls.

6. An apparatus for forming spinnable sliver from continuous length filaments, comprising in an operative combination, means for continuously feeding the work through the apparatus, cutting means for severing the work obliquely to its path of travel, means for operating the cutting means without interrupting the feeding means, and means for rotating the work after being cut through substantially 90°.

7. An apparatus for forming spinnable sliver from continuous length filaments, comprising in an operative combination, means for continuously feeding the work through the apparatus, cutting means for severing the work obliquely to its path of travel, means for operating the cutting means without interrupting the feeding means, means for condensing the severed staple fibers, and means for rotating the work after being cut through substantially 90°.

8. An apparatus for forming spinnable sliver from continuous length filaments, comprising in an operative combination, means for continuously feeding the work through the apparatus, cutting means for severing the work obliquely to its path of travel, means for operating the cutting means without interrupting the feeding means, means for condensing the severed staple fibers, and means for rotating the work after cut through substantially 90°, said means being all synchronously related as to time of operation.

9. An apparatus for forming spinnable sliver from continuous length filaments comprising in an operative combination means for continuously feeding the work through the apparatus, cutting means for severing the work obliquely to its path of travel, a pair of endless belts for receiving between them the cut sliver in one plane, turning the same into a different plane by rotation about an axis parallel to the direction of travel of the work and delivering it to the desired point.

10. An apparatus for forming spinnable sliver from continuous length filaments comprising in an operative combination means for continuously feeding the work through the apparatus, cutting means for severing the work obliquely to its path of travel, a pair of endless belts for receiving between them the cut sliver and delivering it to the desired point, said belts being arranged to turn the work about an axis parallel to the direction of travel of the work through substantially 90° during the travel of the work between them.

11. An apparatus for forming spinnable sliver from continuous length filaments comprising in an operative combination means comprising rolls for continuously feeding the work through the apparatus, cutting means for severing the work obliquely to its path of travel, a pair of endless belts traveling over pulleys revolving on axes substantially parallel to the axes of the feeding rolls at their receiving end and over pulleys whose axes are at substantially right angles to the axes of the feeding rolls at the delivery ends of the belts for receiving between them the cut sliver and delivering it to the desired point but revolved through 90 .

12. The process of forming spinnable sliver from filaments of continuous lengths, which comprises continuously feeding said filaments in generally parallel contiguous relation in a length-

wise direction, cutting said filaments obliquely to their line of travel while moving to provide staple fibers, turning the mass of fibers through a portion of a complete revolution to dispose said cut in a different plane and feeding said staple fibers to a drawing apparatus.

13. An apparatus for forming spinnable sliver from continuous length filaments comprising in an operative combination means for continuously feeding the work through the apparatus, cutting means for severing the work obliquely to its path of travel, and a fixed member having an orifice through which the work passes with helically disposed ribs projecting into the orifice to cause a turning of the work through 90° as it passes therethrough.

14. An apparatus for forming spinnable sliver from continuous length filaments comprising in an operative combination means for continuously feeding the work through the apparatus, cutting means for severing the work obliquely to its path of travel, and a fixed member having an orifice through which the work passes with helically disposed ribs projecting into the orifice to cause a turning of the work through a portion of a complete revolution.

15. The process of forming spinnable sliver from filaments of continuous lengths which comprises continuously feeding a mass of filaments in generally parallel contiguous relation in a lengthwise direction, positively gripping said filaments while advancing to prevent lateral movement, and while so positively gripped cutting said mass of filaments obliquely to their line of travel while moving to provide staple fiber, and engaging and feeding the cut sections of staple fibers to a drawing apparatus while maintaining the fibers in substantially parallel position and free from any substantial longitudinal pushing of one cut group of fibers upon another.

16. The process of forming spinnable sliver from filaments of continuous lengths which comprises continuously feeding a mass of filaments in generally parallel contiguous relation in a lengthwise direction, positively gripping said filaments while advancing to prevent lateral movement, and while so positively gripped cutting said mass of filaments obliquely to their line of travel while moving to provide staple fiber, and condensing into a more compact mass, and feeding the cut sections of staple fibers to a drawing apparatus while maintaining the fibers in substantially parallel position and free from any substantial longitudinal pushing of one cut group of fibers upon another.

17. The process of forming spinnable sliver from filaments of continuous lengths which comprises continuously feeding a mass of filaments in generally parallel contiguous relation in a lengthwise direction, positively gripping said filaments while advancing to prevent lateral movement, and while so positively gripped cutting said mass of filaments obliquely to their line of travel while moving to provide staple fiber, engaging the cut sections of staple fibers and turning them through substantially 90° to dispose the plane of the cut ends one overlying the other from bottom to top and feeding the sections of staple fibers to a drawing apparatus while maintaining the fibers in substantially parallel position and free from any substantial longitudinal pushing of one cut group of fibers upon another.

18. The process of forming spinnable sliver from filaments of continuous lengths which comprises continuously feeding a mass of filaments in generally parallel contiguous relation in a lengthwise direction, positively gripping said filaments while advancing to prevent lateral movement, and while so positively gripped cutting said mass of filaments obliquely to their line of travel while moving to provide staple fiber, condensing said cut sections into a more compact mass, engaging the cut sections of staple fibers and turning them through substantially 90° to dispose the plane of the cut ends one overlying the other from bottom to top and feeding the sections of staple fibers to a drawing apparatus while maintaining the fibers in substantially parallel position and free from any substantial longitudinal pushing of one cut group of fibers upon another.

19. An apparatus for forming spinnable sliver from filaments of continuous lengths comprising means for continuously feeding a mass of filaments in generally parallel contiguous relation in a lengthwise direction, rotary cutting means for severing said mass of filaments while being fed forward, said feeding means including rotating means for gripping said filaments while advancing and located adjacent and in back of and in front of said cutting means for preventing lateral movement of said filaments, said feeding means being so constructed and arranged as to maintain the fibers in substantially parallel position and free from any substantial longitudinal pushing of one cut group of fibers upon another.

20. An apparatus for forming spinnable sliver from filaments of continuous lengths comprising a rotary helical shear for severing said mass of filaments, nipping rolls having their axes parallel and closely adjacent to said shear and in back and in front of said shear for sufficiently gripping the filaments while being cut to prevent lateral movement thereof, means for rotating said rolls, feeding means forward of said rolls so constructed and arranged as to maintain the fibers in substantially parallel position and free from any substantial longitudinal pushing of one cut group of fibers upon another.

21. An apparatus for forming spinnable sliver from filaments of continuous lengths comprising a rotary helical shear for severing said mass of filaments, nipping rolls having their axes parallel and closely adjacent to said shear and in back and in front of said shear for sufficiently gripping the filaments while being cut to prevent lateral movement thereof, feeding means comprising a pair of feed rolls forward of the front nipping rolls with their axes spaced along the length of travel of the fibers substantially the length of the severed staple fiber formed, said feeding means being so constructed and arranged as to maintain the fibers in substantially parallel position and free from any substantial longitudinal pushing of one cut group of fibers upon another, and means for rotating all of said rolls.

22. An apparatus for forming spinnable sliver from filaments of continuous lengths comprising means for continuously feeding a mass of filaments in generally parallel contiguous relation in a lengthwise direction, rotary cutting means for severing said mass of filaments while being fed forward, said feeding means including rotating means for gripping said filaments while advancing and located adjacent and in back of and in front of said cutting means for preventing lateral movement of said filaments, and

means for turning the groups of fibers in the cut sections through substantially 90° to dispose the plane of the cut ends one overlying the other from top to bottom, said feeding means being so constructed and arranged as to maintain the fibers in substantially parallel position and free from any substantial longitudinal pushing of one cut group of fibers upon another.

23. The process of forming spinnable sliver from filaments of continuous lengths which comprises continuously feeding a mass of filaments in generally parallel contiguous relation in a lengthwise direction, positively gripping said filaments while advancing to prevent lateral movement, and while so positively gripped cutting said mass of filaments while moving to provide staple fiber, and engaging and feeding the cut sections of staple fibers to a drawing apparatus while maintaining the fibers in substantially parallel position not depending on any substantial longitudinal pushing of one cut group of fibers upon another.

24. The method of producing a sliver from artificial filaments which comprises arranging a plurality of continuous filaments in parallel relation, cutting said parallel filaments to form a plurality of groups of parallel staple fibers in each of which the adjacent fibers are progressively longitudinally displaced in the same direction, then supporting the fibers throughout their lengths while positively carrying the same on a longitudinally extending moving surface and simultaneously with said carrying, moving the fibers transversely to cause some of the fibers to move out of said plane in superposed relation and overlapping the fibers of said groups while maintaining the fibers of each group longitudinally displaced.

NELSON S. CAMPBELL.