July 22, 1941. W. A. DICKIE ET AL 2,249,809

PRODUCTION OF STAPLE FIBER YARNS OR LIKE PRODUCTS FROM CONTINUOUS FILAMENTS

Filed March 23, 1940

2 Sheets-Sheet 1

FIG. 1

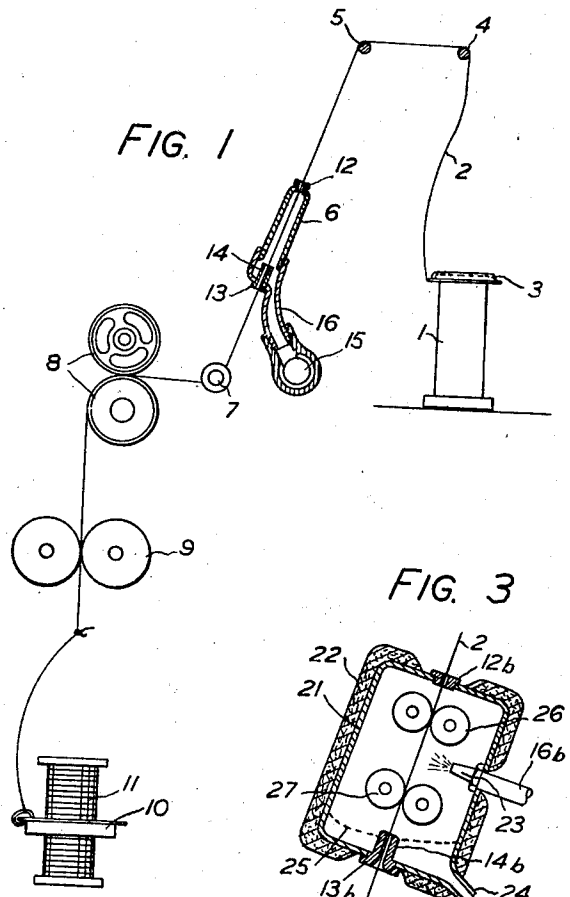


FIG. 2

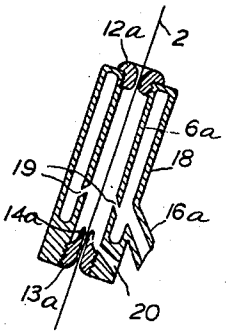


FIG. 3

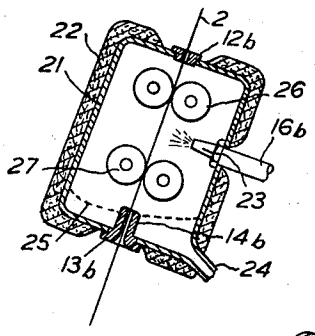
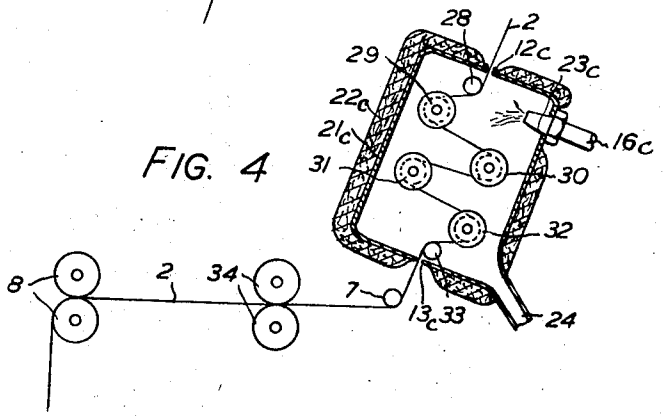


FIG. 4



William A. Dickie
William I. Taylor
Inventors
by
J Seltzer and bW Levinson
Attorneys

July 22, 1941. W. A. DICKIE ET AL 2,249,809

PRODUCTION OF STAPLE FIBER YARNS OR LIKE PRODUCTS FROM CONTINUOUS FILAMENTS

Filed March 23, 1940 2 Sheets-Sheet 2

FIG. 5

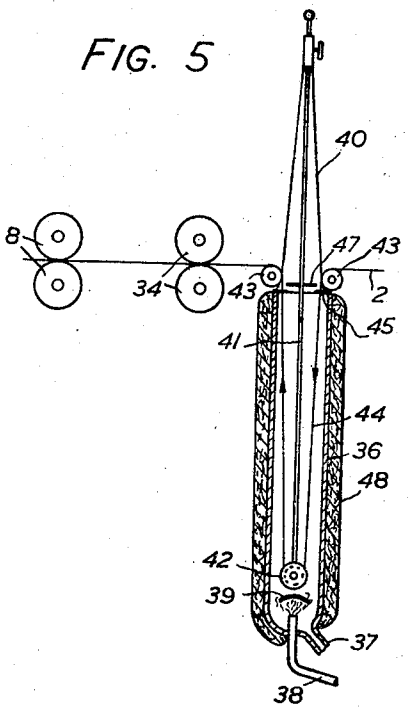


FIG. 6

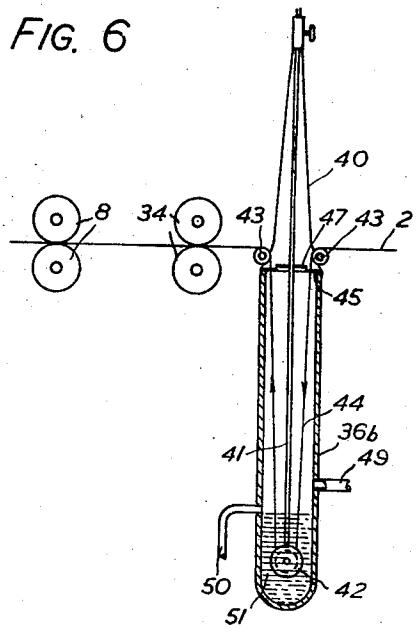


FIG. 7

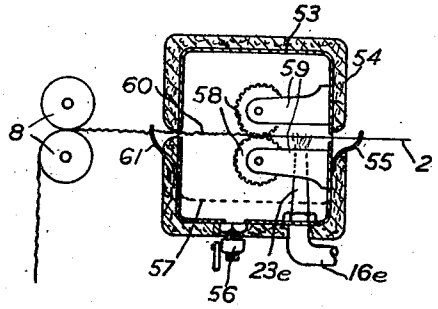
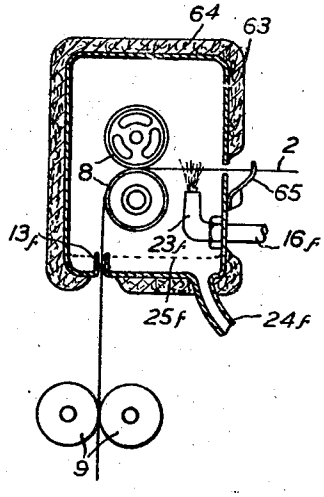


FIG. 8



Inventors
William A. Dickie
William I. Taylor
by
Heltzer and [illegible]
Attorneys

Patented July 22, 1941 2,249,809

UNITED STATES PATENT OFFICE

2,249,809

PRODUCTION OF STAPLE FIBER YARNS OR LIKE PRODUCTS FROM CONTINUOUS FILAMENTS

William Alexander Dickie and William Ivan Taylor, Spondon, near Derby, England, assignors to Celanese Corporation of America, a corporation of Delaware

Application March 23, 1940, Serial No. 325,554
In Great Britain April 22, 1939

26 Claims. (Cl. 19—1)

This invention relates to the production of staple fiber yarns or like products from continuous filaments.

The invention is especially concerned with the method of converting continuous filaments directly into staple fiber products by submitting a bundle of continuous filaments to the action of a cutting surface, in contact with which the bundle is drawn in such a way that there is relative motion between the surface and the bundle. The cutting surface exerts a light cutting action on the surface of the bundle of filaments whereby the filaments are individually severed at frequent intervals without at any time, however, being severed simultaneously at any one point in the bundle whereby the continuity of the bundle would be lost. The resulting continuous staple fiber product may be given a degree of twist in addition to any that may have been possessed by the continuous filament bundle in the first place, so as to ensure that a coherent continuous twisted staple fiber yarn results.

According to the present invention a bundle of continuous filaments is subjected to the action of a softening agent for the substance of the filaments, and while still under the influence of said softening agent is converted into a continuous staple fiber product in the manner described above. The action of the softening agent facilitates the cutting action that is exerted upon the individual filaments and improves the properties of the resulting continuous staple fiber product.

The invention is of particular advantage in the conversion into a staple fiber product of continuous filaments of cellulose acetate or other organic derivative of cellulose. Examples of other organic derivatives of cellulose are other celulose esters such as cellulose formate, cellulose propionate and cellulose butyrate, and the cellulose ethers such as ethyl and benzyl cellulose. The softening agent preferably employed for filaments of organic derivatives of cellulose is moist steam. Other softening agents may be employed, however, alternatively or in addition. Thus, there may be mixed with the steam vapours of a substance having a solvent or softening action upon the cellulose derivative employed, or such vapours may be employed alone or with a suitable diluent such as air. Or again, instead of moist steam hot water may be employed to exert a softening action on the substance of the filaments.

The conversion of the continuous filaments into a staple fiber product may be effected alone or it may be effected simultaneously with other operations in which the influence of the softening agent upon the substance of the filaments may be advantageous. Thus for example, the continuous filaments while under the influence of the softening agent may be passed through crimping rollers before being converted into a staple fiber product, or they may be stretched, e. g. by passing through two or more pairs of nip rollers rotating at different speeds or by passing in a zig-zag manner around tension rods or rollers. The above additional operations may be carried out in the presence of the softening agent, e. g. in a chamber filled with the softening agent, the subsequent conversion of the continuous filaments into staple fibers being effected after the filaments have left the softening agent but while they are still in a softened state. Alternatively, where the conversion of the continuous filaments into staple fibers is effected alone, such conversion may be effected actually in the presence of the softening agent.

The softening agent may be applied to the continuous filaments by passing them through suitable orifices laterally across a pipe to which the softening agent is applied as described, for example, in U. S. Patent No. 2,089,198, or again they may be passed through a short tube forming a chamber off-set from such a pipe, as described in U. S. Patent 2,089,200. An alternative form of apparatus for applying the softening agent whereby the difficulties of threading continuous filaments through orifices are avoided is in the form of a tube, closed or substantially closed at one end, into which the filaments are pushed in the form of a running loop by means of a bar having at its end a roller. The above form of apparatus is also suitable for the subjection of the continuous filaments to the action of a liquid instead of or as well as a vapour, since a suitable quantity of liquid may be contained in the bottom of the tube and the loop of continuous filaments may be pressed under the level of the liquid by means of the roller on the bar. Where the conversion of continuous filaments into staple fibers, or other auxiliary operation, is carried out actually in the presence of the softening agent the softening agent may be supplied to a chamber suitably lagged and drained if desired, containing the apparatus for carrying out the operation.

By way of example, several forms of apparatus suitable for carrying out the invention will now be described in greater detail with reference to the accompanying drawings, in which

Figure 1 is a side elevation of an apparatus for carrying out the invention showing the general layout of the apparatus;

Figure 2 shows a modification of a detail of Figure 1;

Figures 3 and 4 are sectional diagrammatical side elevations of two forms of apparatus in which a continuous filament bundle may be stretched simultaneously with carrying out the present invention;

Figures 5 and 6 show two modified forms of apparatus for applying a softening agent to the continuous filaments; and

Figures 7 and 8 show two further modifications of the invention.

The simple form of apparatus shown in Figure 1 comprises a source of supply of a bundle of continuous filaments in the form of a bobbin 1, which is arranged so that the continuous filaments 2 may be drawn over its end, a suitable guide cap 3 being placed over the top flange of the bobbin 1 to minimise friction. The filaments are led upwards, over a pair of guide bars 4, 5, obliquely downward through a short tube 6 in which wet steam is applied to the filaments, around a rotatable guide 7 and then horizontally to the nip of a pair of rollers 8, e. g. of the kind described in U. S. Patent 2,077,079, for converting the continuous filament bundle 2 into a continuous staple fiber product. As described in the above specification, the filaments 2 are drawn from their source of supply 1 by means of a pair of gripping rollers 9 following the cutting rollers 8, and are forwarded by said gripping rollers 9 to a ring spinning device 10 by means of which the staple fiber product is collected on the bobbin 11.

The tube 6 in which the moist steam is applied to the continuous filaments is a short tube of, say, 2 or 3 inches in length and ¾ of an inch in diameter and is provided at its upper end with a stainless steel nipple 12 through which the continuous filaments 2 enter the tube. Another stainless steel nipple 13 is provided at the lower end of the tube 6 by which the filaments 2 leave the tube, and the latter nipple is carried up for a short distance inside the tube 6 at 14 so as to form a trap for condensed moisture. The tube 6 is supplied with moist steam from a header 15 by a connection 16 to one side of the lower end of the tube. In order to prevent moist steam, emerging through the lower nipple, from impinging on the nip rollers 8 by means of which the bundle of filaments 2 is converted into staple fibers, the continuous filaments 2 emerging from the tube 6 are caused to change their direction by passing around the roller guide 7 as described above.

A modification of the tube 6 described above is shown in Figure 2. The modified tube 6a is provided with a jacket 18 surrounding the tube and supplied with steam, the steam being supplied to the tube 6a itself by inlets 19 leading from the jacket 18 to the interior of the tube 6a. In this case, any condensed moisture forming in the tube 6a is unable to run back into the steam supply pipe 16a and accordingly a drain 20 for the condensate is supplied near the bottom of the tube 6a and below the upwardly extending portion 14a of the lower or outlet nipple 13a.

Figs. 3 and 4 show two forms of apparatus in which the continuous filaments may be submitted to a stretching or straining operation while they are in the presence of steam and before being converted into a continuous staple fiber product.

In Fig. 3 the continuous filament bundle 2, instead of passing through a tube 6 or 6a as in Figs. 1 and 2, respectively, passes through a chamber 21 provided with lagging 22 and supplied with steam through a nozzle 23 to which the steam supply pipe 16b is connected. The chamber 21 is provided with a drain 24 for condensed steam. The near wall of the chamber (which is not shown, since the view is a sectional view) fits on the side of the chamber as a lid. In order however, to prevent the condensate running out of the side of the chamber, the chamber is provided with an additional and permanent low wall whose upper edge is indicated by the dotted line 25.

Within the chamber 21 the continuous filament bundle 2 passes through two pairs of nip rollers 26, 27, the rollers 27 being positively rotated at a higher speed than the rollers 26. By these means the filaments in the bundle 2 are stretched while they are under the influence of steam impinging upon them from the jet 23. On leaving the rollers 27 the filaments leave the chamber 21 by the outlet nipple 13b and proceed, as in Fig. 1, around the guide 7 through rollers 8 and 9 to a collecting device 10, 11.

Fig. 4 shows a modification of Figure 3 in which, instead of the nip rollers 26, 27, tension rollers or rods 29, 30, 31 and 32 are provided. The filament bundle 2 entering the chamber 21c passes around a rotatable guide 28, then in succession around the 4 rods 29 to 32 in the form of a zig-zag. The bundle 2 then passes around a further rotatable guide 33 and leaves the chamber. Outside the chamber, after passing around the rotatable guide 7 the bundle 2 is passed through a pair of nip rollers 34 which serve to relieve the tension imparted to the bundle before the bundle proceeds to the cutting rollers 8. The rods or rollers 29, 30, 31, 32 are positively driven at successively higher speeds so as to stretch the bundle 2 inside the chamber.

An alternative form of means that is shown in Fig. 5 for applying moist steam to the continuous filaments comprises a deep narrow vessel or tube 36 of U section provided at the bottom with a drain 37 for condensed moisture, and supplied with steam through an inlet 38 entering the bottom of the tube. A small baffle 39 is provided immediately over the steam inlet 38 so as to distribute the steam. Slidably carried in a suitable support 40 over the tube 36 is a vertical rod 41 having a roller 42 mounted at its lower end. Guide rollers 43 are provided immediately over the upper edges of the tube 36 and a bundle of continuous filaments 2, initially passing over said guide rollers 43 and over the mouth of the tube 36 to nip rollers 34 and cutting rollers 8, may be pressed down in the form of a running loop 44 into the tube 36 by means of the roller 42 at the lower end of the vertical rod 41. The tube 36 is provided with an inwardly extending rim 45 which is notched to allow the yarn to enter the tube 36, a flat circular plate 47 being carried by the vertical rod 41 and adapted to rest on said rim 45 so that the upper end of the tube 36 is closed except for the apertures formed by the notches in the rim 45. The whole tube is suitably lagged as shown at 48 to avoid undue loss of heat.

In a modification of the above form of apparatus shown in Fig. 6, the steam is supplied by an inlet 49 in the side of the tube 36b at some

distance from the bottom, and instead of a drain 37 for condensed moisture at the bottom of the tube an overflow 50 is provided a short distance below the steam inlet 49. By these means a small quantity 51 of water or other liquid may be maintained in the bottom of the tube 36b and the loop 44 of yarn 2 may be caused to dip below the level of said liquid 51 by means of the roller 43 on the lower end of the vertical rod 41.

In Fig. 7 is shown a form of apparatus in which the continuous filaments may be crimped while under the influence of steam and before being converted into a continuous staple fiber product. The apparatus shown comprises a chamber 53 provided with lagging 54 and supplied with steam through a nozzle 23e and supply pipe 16e as in Figures 3 and 4. The continuous filament bundle 2 enters the chamber 53 by way of a guide 55. A drain 56 and a wall 57 for retaining condensate are indicated at the bottom of the chamber 53. Within the chamber, the filaments 2 pass between a pair of toothed or serrated rollers 58 mounted in brackets 59 and positively driven from outside the chamber 53. By reason of the softening of the filaments 2 under the action of the steam entering the chamber through the nozzle 23e, the filaments are crimped by the rollers 58 as is shown at 60. The crimped filaments 60 leave the chamber 53 by a guide 61 and proceed thence to the cutting rollers 8.

Fig. 8 shows a form of apparatus in which the continuous filament bundle 2 is converted into a continuous staple fiber product while it is actually in the presence of wet steam. This is done by surrounding the cutting rollers 8 with a chamber 63 provided with lagging 64 and fed with steam through the nozzle 23f and supply pipe 16f. The filament bundle 2 enters the chamber 63 by way of a guide 65, passes between the rollers 8 which are disposed within the chamber 63 and then proceed vertically downwards to leave the chamber by the exit nipple 13f on their way to gripping rollers like the rollers 9 of Fig. 1.

Having described our invention, what we desire to secure by Letters Patent is:

1. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments to the action of a softening agent for the substance of the filaments, drawing said bundle, while said filaments are still under the influence of said softening agent, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

2. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments to the action of a softening agent containing the vapors of a material having a solvent or softening action upon the substance of the filaments, drawing said bundle, while said filaments are still under the influence of said softening agent, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

3. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments to the action of a softening agent for the substance of the filaments, crimping the filaments while they are under the influence of said softening agent, drawing said bundle, while said filaments are still under the influence of said softening agent, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

4. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments to the action of a softening agent for the substance of the filaments, submitting the continuous filaments to a stretching or straining operation while they are under the influence of said softening agent, drawing said bundle, while said filaments are still under the influence of said softening agent, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

5. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments to the action of a softening agent for the substance of the filaments, drawing said bundle, in the presence of said softening agent, over and in contact with a cutting surface contained in said softening agent, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

6. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments of an organic derivative of cellulose to the action of a softening agent for the substance of the filaments, drawing said bundle, while said filaments are still under the influence of said softening agent, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

7. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments of cellulose acetate to the action of a softening agent for the substance of the filaments, drawing said bundle, while said filaments are still under the influence of said softening agent, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

8. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a

bundle of continuous filaments of an organic derivative of cellulose to the action of moist steam, drawing said bundle, while said filaments are still under the softening influence of said steam, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

9. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments of cellulose acetate to the action of moist steam, drawing said bundle, while said filaments are still under the softening influence of said moist steam, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

10. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments of an organic derivative of cellulose to the action of hot water, drawing said bundle, while said filaments are still under the softening influence of said hot water, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

11. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments of cellulose acetate to the action of hot water, drawing said bundle, while said filaments are still under the softening influence of said hot water, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

12. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments of cellulose acetate to the action of moist steam, crimping the filaments while they are under the influence of said moist steam, drawing said bundle, while said filaments are still under the softening influence of said moist steam, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

13. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments of cellulose acetate to the action of moist steam, submitting the continuous filaments to a stretching or straining operation while they are under the softening influence of said moist steam, drawing said bundle, while said filaments are still under the influence of said moist steam, over and in contact with a cutting surface, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

14. Process for the production of a continuous staple fiber product from a bundle of continuous filaments, said process comprising subjecting a bundle of continuous filaments of cellulose acetate to the action of moist steam, drawing said bundle, in the presence of said moist steam, over and in contact with a cutting surface contained in said moist steam, pressing the filaments against said cutting surface, and imparting to said cutting surface a motion relative to said bundle, whereby the filaments are individually severed at frequent intervals so as to form a continuous staple fiber product.

15. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a chamber, inlet and outlet apertures for a bundle of continuous filaments passing through said chamber, means for supplying a softening agent to said chamber, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent, means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

16. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a chamber, an inlet aperture for a bundle of continuous filaments passing through said chamber, means for supplying a softening agent to said chamber, an outlet nipple for the emergence of the filaments from said chamber, said nipple extending for some distance inside said chamber so as to form a trap for condensed softening agent, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent, means for pressing said filaments against said cutting surface, and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

17. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a chamber, inlet and outlet apertures for a bundle of continuous filaments passing through said chamber, a steam jacket for said chamber, the sides of said chamber being perforated so as to admit steam from said jacket to said chamber, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of the steam entering said chamber from said jacket, means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

18. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a chamber, inlet and outlet apertures for a bundle of continuous filaments passing through said chamber,

a series of rollers within said chamber adapted to act upon said bundle, means for supplying a softening agent to said chamber, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent, means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

19. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a chamber, inlet and outlet apertures for a bundle of continuous filaments passing through said chamber, at least one pair of nip rollers within said chamber between which said bundle passes, means for supplying a softening agent to said chamber, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent. means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

20. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a chamber, inlet and outlet apertures for a bundle of continuous filaments passing through said chamber, two pairs of nip rollers within said chamber, each adapted to nip said bundle, means for driving said nip rollers at different speeds so as to stretch said filaments, means for supplying a softening agent to said chamber, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent, means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

21. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a chamber, inlet and outlet apertures for a bundle of continuous filaments passing through said chamber, a pair of rollers within said chamber between which the said bundle passes, said rollers having corrugated intermeshing surfaces so as to crimp said filaments, means for supplying a softening agent to said chamber, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent, means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

22. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a chamber, inlet and outlet apertures for a bundle of continuous filaments passing through said chamber, means for supplying a softening agent to said chamber, a cutting surface within said chamber, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent, means within said chamber for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

23. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a chamber, inlet and outlet apertures for a bundle of continuous filaments passing through said chamber, means for supplying a softening agent to said chamber, a cutting surface outside said chamber, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent, a guide between said chamber and said surface to cause said filaments to change direction after emerging from said chamber so as to prevent a jet of softening agent from impinging upon said cutting surface, means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

24. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a long, narrow chamber, means for pressing a bundle of continuous filaments in the form of a running loop into said chamber, means for supplying a softening agent to said chamber, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent, means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

25. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a long, narrow chamber, means for pressing a bundle of continuous filaments in the form of a running loop into said chamber, means for supplying a softening agent to said chamber, an overflow from said chamber at some distance above the bottom to permit said chamber to contain a quantity of liquid below the surface of which said continuous filament bundle is pressed, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of said softening agent, means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

26. Apparatus for converting a bundle of continuous filaments into a continuous staple fiber product, said apparatus comprising a long, narrow chamber, means for pressing a bundle of continuous filaments in the form of a running loop into said chamber, a steam inlet to said chamber, a baffle over said steam inlet, a cutting surface, means for drawing continuous filaments over said cutting surface while they are still under the influence of steam, means for pressing said filaments against said cutting surface and means for driving said cutting surface with a motion relative to said filaments whereby said filaments are converted into a continuous staple fiber product.

WILLIAM ALEXANDER DICKIE.
WILLIAM IVAN TAYLOR.