Aug. 25, 1942. N. S. CAMPBELL 2,293,712

CONDENSER

Filed April 9, 1941

Fig. 1.

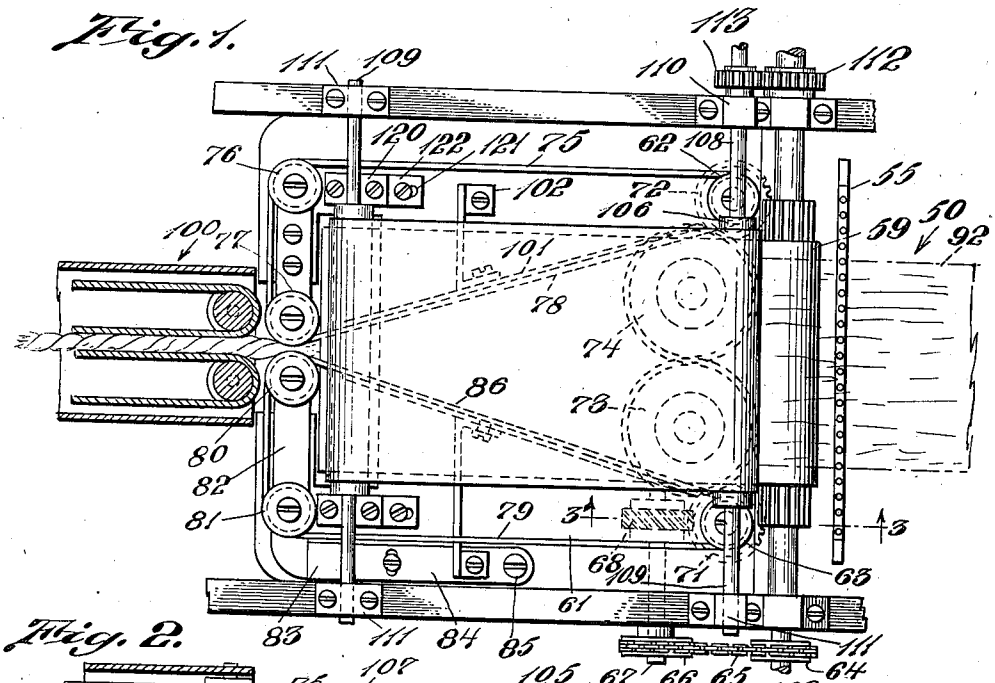


Fig. 2.

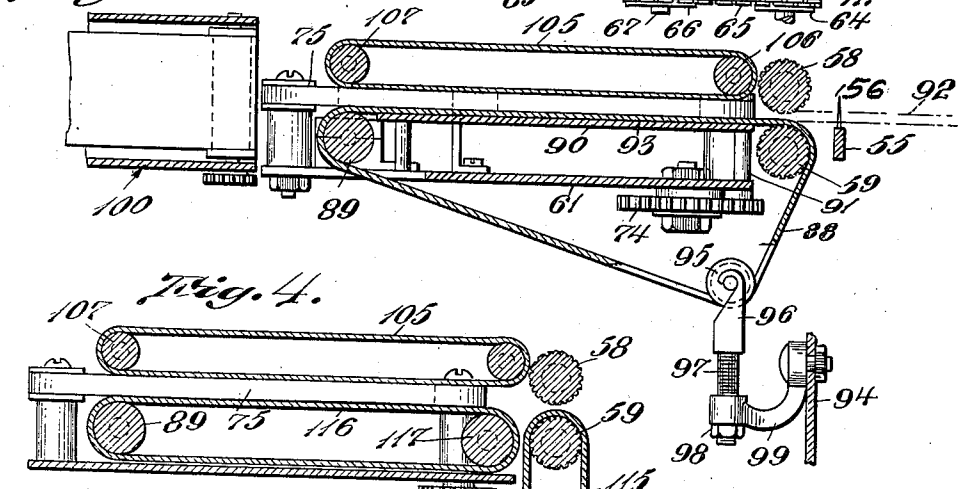
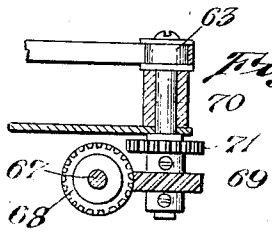


Fig. 4.

Fig. 3.



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UNITED STATES PATENT OFFICE

2,293,712

CONDENSER

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Application April 9, 1941, Serial No. 387,638

17 Claims. (Cl. 19—150)

This application is a continuation in part of my application Serial No. 292,680 filed August 30, 1939. The invention relates to an apparatus for handling textile fibers such for instance as the performing of certain steps in a process for the formation of staple fiber sliver which process is more fully described in my co-pending application Serial No. 340,415 filed June 14, 1940, and more particularly relates to an improvement of the condenser already illustrated in the said applications.

The invention has for one of its objects the handling of fibers or synthetic filaments which are of a rather wild and unruly nature such, for instance, as mohair, rayon, celanese, or Bemberg to condense a web of such synthetic filaments into a rope or sliver for further textile operations.

Another object of the invention is to provide traveling means engaging the fibers and moving with the fibers through the apparatus and while so moving to condense or change the work from one shape to another.

Another object of the invention is to so convey the work that it is subjected to no friction to oppose its forward travel while a condensing action takes place to crowd the filaments or fibers into a different arrangement as they proceed through the apparatus.

Another object of the invention is to provide a condenser having an arrangement which will receive the fibers in a mouth or opening larger than the width of the mass of fibers to be received and then move the fibers laterally into a different relation as they are traveling forward.

Another object of the invention is to provide a stroking of the fibers as they are condensed.

Another object of the invention is to provide a clearer for the upper roll of the apparatus from which the work is received.

A further object of the invention is to hold the fibers of the work against flying upwardly as they travel through the condensing operation.

A more specific object of the invention is to utilize a single belt which is usually a part of a gilling unit for operation in both the preceding gill and this apparatus for conveying the fibers through the condenser which is the subject of this application.

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 drawing:

Fig. 1 is a top plan view of the condenser and also shows a portion of the gilling apparatus preceding the action of the condenser on the work with the upper of the two delivery rolls omitted and a portion of a false twisting apparatus which performs a subsequent operation upon the work;

Fig. 2 is a sectional view of the condenser shown in Fig. 1 and parts of the gilling and false twisting apparatus;

Fig. 3 is a section on line 3—3 of Fig. 1;

Fig. 4 is a sectional view of the condenser similar to Fig. 2 but illustrating a modified arrangement of only the belts and rolls in their relationship.

In the treating of filaments of continuous length to provide staple fiber therefrom, I find that such filaments as rayon, celanese, Bemberg or possibly other synthetic filaments, are of such an unruly nature that it is difficult to handle them. Friction on these filaments along any of the parts of an apparatus operating on the filaments tends to disrupt them and make treatment difficult and in order that the web of the material consisting of these filaments may be transformed into a rope-like formation or sliver, I have provided for a condenser having a plurality of traveling aprons which will move with the work to convey it and at the same time condense it prior to the application of a false twist in the process of treating the work, as more fully described in the complete process application above mentioned; 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:

With reference to the drawing, I illustrate at **50** a part of a gilling mechanism which precedes the operation of my condenser upon the work. One of the gill bars and its needles is designated **55** with the needles **56** positioned thereon, the intersecting bar with its needles of the gilling operation not being shown. The delivery rolls **58** and **59** of the gilling mechanism are illustrated in Fig. 2 (roll **58** being omitted in Fig. 1 for clearness).

The condenser which is the subject of this application consists of a bed plate **61** which supports two driving rolls **62** and **63** which are driven from a rotating part of the adjacent apparatus, such as by means of sprocket gear **64**, sprocket chain **65**, sprocket gear **66**, shaft **67**, spiral gears **68** and **69**, the latter of which is on shaft **70** of the roll **63**. A gear **71** drives the correspond-

ing gear 72 on the shaft of roll 62 by intermeshing intermediate gears 73 and 74 in plan view in Fig. 1.

A belt 75 extends about the roll 62 and also about idler rolls 76 and 77 to dispose the belt in generally triangular formation with the work-engaging span 78 of the belt at an angle to the direction of movement of the work through the apparatus. A belt 79 extends about the pulley 63 and also about idler pulleys 80 and 81 which are mounted on one arm 82 of an L-shaped bracket 83 which has its other arm 84 pivoted as at 85 outside of the area enclosed by the belt 79. One work-engaging span 86 of this belt is likewise angularly disposed with reference to the direction of travel of the work so that both work-engaging spans of belts 78 and 86 form a V-shaped opening between them.

A convenient means of urging the belts 75 and 79 together is provided and by reason of the pivotal mounting of the rolls 80 and 81 on the L-shaped bracket 83 the tension serves to swing the span 86 of belt 79 toward the span 78 of the other belt until the belts are in contact at the location of their pulleys 77 and 80, thus tending to squeeze any material which passes between these pulleys, although allowing a swinging of the belt 79 away from the belt 75 at this location to accommodate varying amounts of work which may pass through or between these rolls.

The inclined spans 78 and 86 of the belts in some cases may be supported by back-up plates 101 which are mounted on brackets 102 extending from the bed plate 61 for span 78 and from the arm 84 for the span 86, one of these back-up plates for each of the spans above indicated being so located that if the tension of the belt is insufficient to hold the same taut against considerable pressure of the work, the back-up plates will assist in supporting this span of the belt for this purpose.

The usual depending apron which encircles the roll 59 of this gilling apparatus is designated 88 and instead of depending as usual, is extended over an idler roll 89 and over a plate 90 which is supported from the bed plate 61 by means of uprights 91. The span 93 of this belt is so located that it will be beneath the inclined spans 78 and 86 so as to support work 92 which leaves the gills and passes between the delivery rolls 58 and 59 and enters between the converging belts 78 and 86, although it is short of the termination of these converging belts as idlers 77, 80 are beyond the end of this supporting belt. The apron 88 is suitably tensioned by pulley 95 supported by member 96 adjustable by threaded rod 97 and nut 98 and supported on bracket 99 from the framework 94.

In some cases it is desirable to provide the belts 75 and 79 only of a width sufficient to accommodate the thickness of the work which is to be passed through the condenser, and in this case I mount an upper apron 105 to engage the upper surface of the work as it travels through the condenser and assist in feeding the work therethrough. This apron encircles roll 106 and roll 107. Rolls 106 and 107 are reduced to provide portions 108 and 109, both having bearings 110 and 111 in the frame of the machine. Roll 106 is suitably driven from roll 59 by gears 112 and 113. Roll 106 is placed so that belt 105 in passing about the same will just clear the surface of roll 58 of the gilling machine, and thus any stray fibers which might extend upwardly will engage this belt 105 to cause the fibers to enter into the condensing mechanism and prevent licking of the fibers about roll 58. This apron 105 also serves to prevent any wild or unruly fibers from extending upwardly over the top edge of the spans 78 or 86 of the converging aprons and thus controls the condensing action more completely by reason of this apron above the work.

The work which is received from the gill in the form of a flat, ribbon-like web of greater breadth than thickness will be transformed into a rope-like sliver as it is delivered from the belts and through the rolls 77 and 80 to the false twisting apparatus designated generally 100.

In the modification illustrated in Fig. 4, the usual gill belt 115 encircles the delivery roll 59 of the gilling machine, and the condenser which I have provided is a separate unit, completely independent of the gilling machine unit. The parts of the condenser in the modified arrangement are the same as heretofore described with the exception of apron 88 of the heretofore described unit. In place of this apron 88, I provide an apron 116 which extends about a roll 117 so mounted that this roll will be adjacent to the roll 59. The apron 116, however, will extend about the roll 89, and the other aprons of the mechanism of the condenser will be the same. This roll 117 will be driven from roll 59 in some suitable manner.

The triangular arrangement of the belts permits the span which extends over and moves with the belt 88 or 116 to converge the fibers while the returning spans are spaced clear of this belt and will not contact or wear on the same. As the spans 78 and 86 of the angular formation have a greater distance to travel than the straight line of the span of the belt 88 or corresponding span of belt 105, these belts will be caused to travel slightly faster to cause the vertical aprons and horizontal aprons to travel at the same uniform speed which may be accomplished by reason of the constant angle to the direction of feed. By reason of the arrangement here provided the capacity for receiving and operating upon wide ribbon or web of work is had. Less licking of the fiber will be had by use of the top horizontally disposed apron.

Roll 89 may be adjusted by reason of its mounting in bearings 120, there being a slot 121 and screw connection 122 for this purpose.

As the mass of fibers is delivered from the condenser, they then enter a false twister or controller where twist is imparted to the mass of condensed fibers in order to form it into a sliver, this apparatus being designated 100. Details of this apparatus are more fully set forth in my copending application, Serial No. 340,415, filed June 14, 1940.

I claim:

1. A condenser for textile fibers comprising a pair of traveling aprons each embracing three pulleys to dispose the aprons in triangular formation, each apron in its span between two pulleys engaging the fibers, said fiber-engaging spans progressively converging, and a traveling supporting apron beneath the fiber-engaging span of said aprons to travel with and support the fibers as they are condensed by said converging aprons, the pulleys at the forward end of fiber engaging spans being beyond the forward end of the supporting apron.

2. A condenser for textile fibers comprising a pair of traveling aprons, each embracing three

pulleys to dispose the aprons in triangular formation, each apron in its span between two pulleys engaging the fibers, said fiber-engaging spans progressively converging, two of the pulleys for one apron being mounted on a movable bracket, said bracket being pivoted outside of the area enclosed by the apron, whereby said bracket and the apron thereon tend to move toward the opposite apron.

3. A condenser for textile fibers comprising a pair of traveling aprons each embracing three pulleys to dispose the aprons in triangular formation, each apron in its span between two pulleys engaging the fibers, said fiber-engaging spans progressively converging, two of the pulleys for one apron being mounted on a movable bracket, said bracket being pivoted outside of the area enclosed by the apron, whereby said bracket and the apron thereon tend to move toward the opposite apron, and a traveling supporting apron beneath the fiber-engaging span of said aprons to travel with and support the fibers as they are condensed by said converging aprons.

4. A condenser for textile fibers comprising a horizontally traveling apron of substantial width, vertical shafts at either side of the marginal edge thereof, drive pulleys on said shafts, closely related idler pulleys beyond the end of said apron, traveling aprons having their fiber-engaging runs in vertical planes, one about each drive pulley and each idler pulley to provide converging stretches of said vertical aprons over the horizontal apron.

5. A condenser for textile fibers comprising a horizontally traveling apron of substantial width, vertical shafts at either side of the marginal edge thereof, drive pulleys on said shafts, closely related idler pulleys beyond the end of said apron, traveling aprons having their fiber-engaging runs in vertical planes, one about each drive pulley and each idler pulley to provide converging stretches of said vertical aprons over the horizontal apron, a second idler pulley for each apron positioned beyond the projection of the edges of said horizontal apron and about which the vertical aprons are directed to position the return stretch of the vertical aprons beyond the edges of the horizontal apron.

6. A condenser for textile fibers comprising a horizontally traveling apron of substantial width, vertical shafts at either side of the marginal edge thereof, drive pulleys on said shafts, closely related idler pulleys beyond the end of said apron, traveling aprons having their fiber-engaging runs in vertical planes, one about each drive pulley and each idler pulley to provide converging stretches of said vertical aprons over the horizontal apron, a bracket for the idler pulley of one apron and means for pivoting said bracket at a location outside of the enclosure of said apron.

7. A condenser for textile fibers comprising a horizontally traveling apron of substantial width, vertical shafts at either side of the marginal edge thereof, drive pulleys on said shafts, closely related idler pulleys beyond the end of said apron, traveling aprons having their fiber-engaging runs in vertical planes, one about each drive pulley and each idler pulley to provide converging stretches of said vertical apron over the horizontal apron, second idler pulleys positioned beyond the projection of the edges of said horizontal apron and about which the vertical aprons are directed to position the return stretch of the vertical aprons beyond the edges of the horizontal apron, a bracket for the idler pulleys of one apron, and means for pivoting said bracket at a location outside of the enclosure of said apron.

8. A condenser for textile fibers comprising a horizontally traveling apron of substantial width, vertical shafts at either side of the marginal edge thereof, drive pulleys on said shafts, closely related idler pulleys beyond the end of said apron, traveling aprons having their fiber-engaging runs in vertical planes, one about each drive pulley and each idler pulley to provide converging stretches of said vertical aprons over the horizontal apron, said vertical aprons being driven at a surface speed greater than the surface speed of the horizontal apron.

9. In combination with the lower delivery roll of a gilling apparatus, a condenser having a horizontal roll, a horizontal apron about said rolls, and converging aprons having their fiber-engaging runs in vertical planes cooperating with said horizontal apron.

10. In combination with the lower delivery roll of a gilling apparatus, a condenser having a horizontal roll, a horizontal apron about said rolls, and converging aprons having their fiber-engaging runs in vertical planes cooperating with said horizontal apron, and means for driving said vertical aprons from said delivery roll.

11. A condenser for textile fibers comprising a horizontally traveling apron of substantial width, vertical shafts at either side of the marginal edge thereof, drive pulleys on said shafts, closely related idler pulleys beyond the end of said apron, traveling aprons having their fiber-engaging runs in vertical planes, one about each drive pulley and each idler pulley to provide converging stretches of said vertical aprons over the horizontal apron, means for driving one of said vertical shafts and means driving the one vertical shaft from the other.

12. The step in the method of handling a web of staple textile fibers to form a sliver which consists in contacting opposite edges of a web of fibers by surface means traveling with the fibers and moving the said traveling surface means toward each other to cause the fibers between the surface means to move toward each other, and thereafter rotating the work about an axis within the work to relatively twist the fibers and form a sliver.

13. The step in the method of handling a web of staple textile fibers to form a sliver which consists in contacting the bottom and opposite edges of a web of fibers by surface means traveling with the fibers and moving the said traveling opposite edge web surface engaging means toward each other to cause the fibers between the surface means to move toward each other, and thereafter rotating the work about an axis within the work to relatively twist the fibers and form a sliver.

14. A condenser for textile fibers comprising a pair of traveling work-engaging aprons with their work-engaging spans generally parallel, a moving delivery surface closely adjacent the entrance to one of said aprons, and a second pair of traveling aprons between the work-engaging surfaces of the first pair with the spans of the aprons of the second pair which engage the work progressively converging.

15. A condenser for textile fibers comprising upper and lower traveling aprons with the work-engaging spans being horizontally arranged and in parallel spaced relation, a moving delivery surface closely adjacent the entrance end of the upper of said aprons, and aprons having their

fiber-engaging runs in vertical planes between the work-engaging surfaces of the horizontal aprons with their work-engaging surfaces progressively converging.

16. In combination with the lower delivery roll of a gilling apparatus, a condenser having a horizontal roll, an apron about said rolls, a second horizontal apron above the first apron, and converging aprons having their fiber-engaging runs in vertical planes cooperating with said horizontal aprons.

17. In combination with the upper delivery roll of a gilling apparatus, a condenser having horizontal upper and lower traveling aprons, converging traveling aprons having their fiber-engaging runs in vertical planes between said horizontal aprons, said upper horizontal apron being located sufficiently close to the upper delivery roll of the gilling apparatus to act as a clearer for said gilling apparatus roll.

NELSON S. CAMPBELL.