Nov. 23, 1965 F. R. LENK, JR 3,218,676

METHOD OF AND APPARATUS FOR FEEDING FIBROUS MATERIAL TO A TEXTILE PROCESSING MACHINE

Filed Aug. 16, 1962 2 Sheets-Sheet 1

Fig. 1.

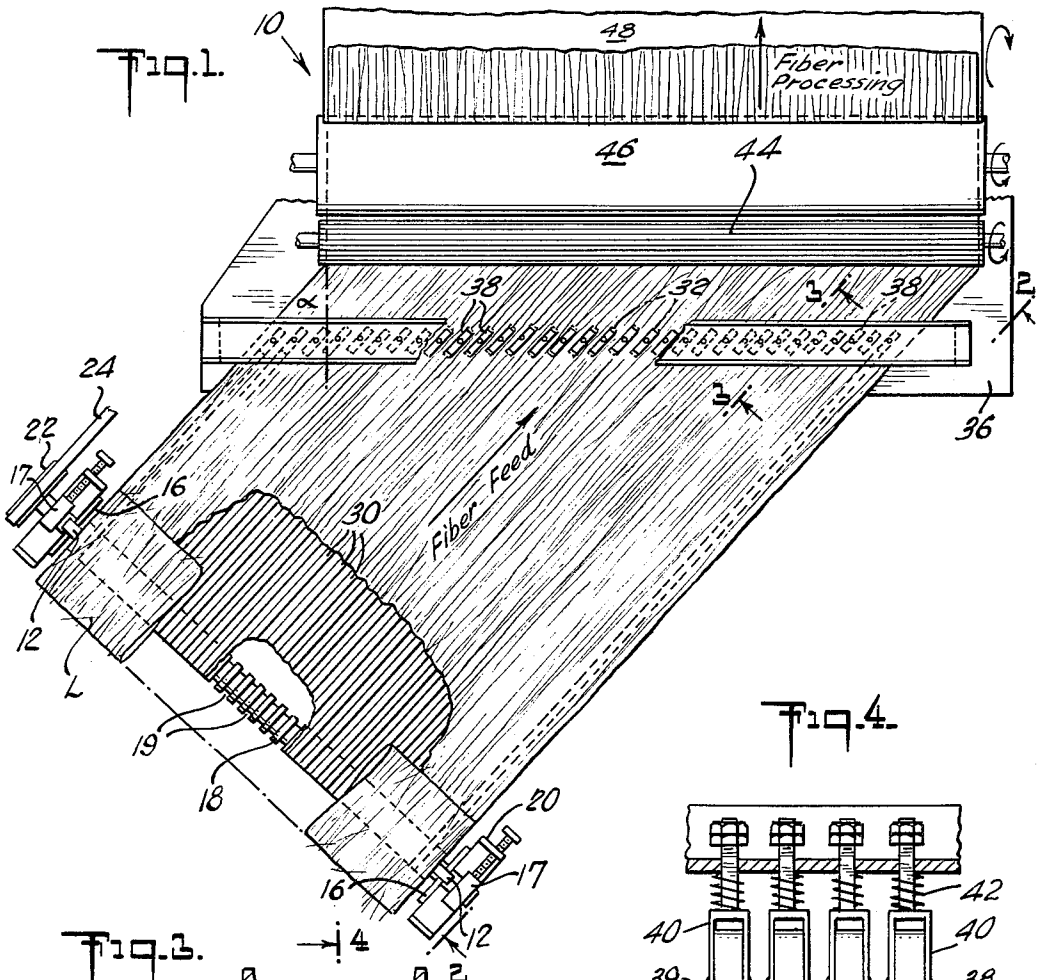


Fig. 3.

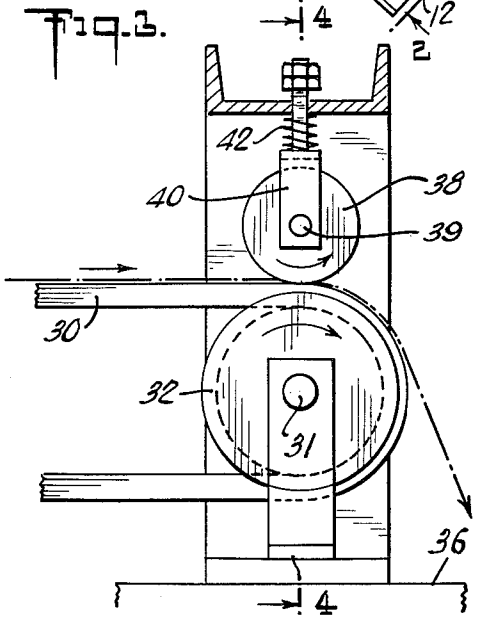
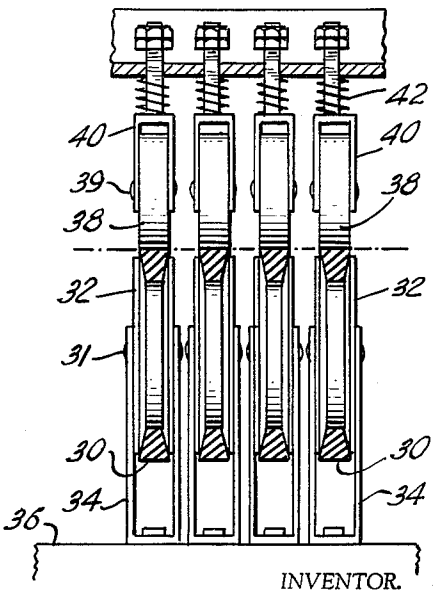


Fig. 4.



INVENTOR.
FREDERICK R. LENK JR.
BY
Alexander T. Kardos.
ATTORNEY

Nov. 23, 1965 F. R. LENK, JR 3,218,676

METHOD OF AND APPARATUS FOR FEEDING FIBROUS MATERIAL TO A TEXTILE PROCESSING MACHINE

Filed Aug. 16, 1962 2 Sheets-Sheet 2

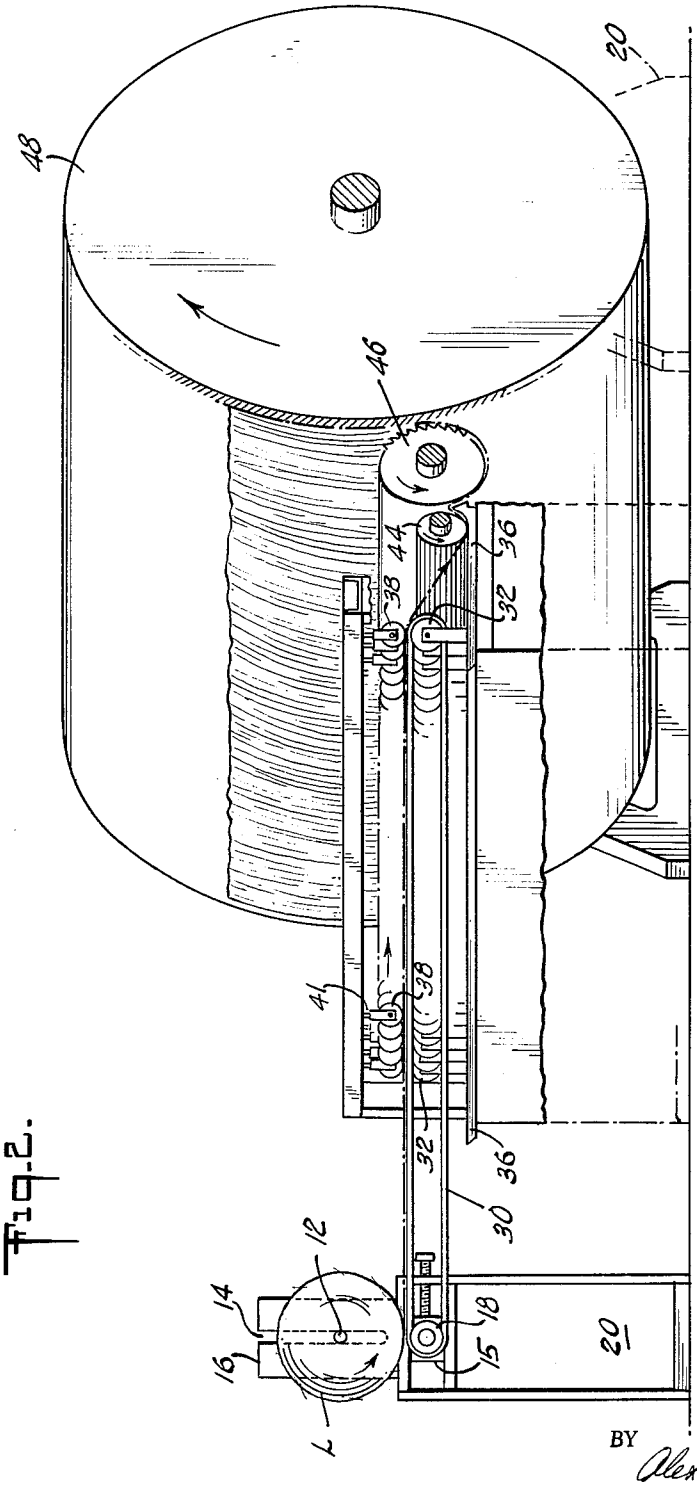


Fig. 2.

INVENTOR.
FREDERICK R. LENK JR.

BY Alexander T. Kardos.

ATTORNEY

United States Patent Office 3,218,676
Patented Nov. 23, 1965

3,218,676

METHOD OF AND APPARATUS FOR FEEDING FIBROUS MATERIAL TO A TEXTILE PROCESSING MACHINE

Frederick R. Lenk, Jr., Gillette, N.J., assignor, by mesne assignments, to Johnson & Johnson, New Brunswick, N.J., a corporation of New Jersey

Filed Aug. 16, 1962, Ser. No. 217,389
5 Claims. (Cl. 19—105)

The present invention relates to techniques for feeding fibrous materials in sheet form to textile machines for processing thereby and more specifically is concerned with the feeding of picker laps to textile carding machines. More particularly, the present invention relates to techniques whereby a narrow picker lap may be uniformly fed to and fill substantially the full width of a textile carding machine having a greater width than the picker lap without requiring special pretreating or prior handling.

In the processing of fibrous materials in sheet form in various textile machines, the raw, unprocessed fibrous materials are normally commercially available in various widths and it is frequently required that they be fed to textile machines having greater widths. For example, picker laps are normally commercially available in widths of from about 40 inches to about 45 inches and it is frequently desired to feed such a picker lap to a textile carding machine having a width of 60 or 72 inches.

The usual method is to take one of these picker laps, place alongside it in butting or overlapping relation a narrow piece cut from another picker lap and feed the two laps side-by-side into the wider carding machine. For example, a 45-inch picker lap is first placed alongside a 15-inch width cut from another picker lap and the two laps are then fed to a 60-inch carding machine.

Such a procedure leaves much to be desired inasmuch as the butted or overlapped joint of the two laps forms a heavy line or a line of weakness in the resulting web and creates non-uniformity of fiber distribution therein, whereby such undesirable properties are carried through to the final carded product.

It is a principal purpose of the present invention to provide techniques for feeding fibrous materials in sheet, lap, web or similar form to textile machines having a greater width than the fibrous material and processing the fibrous material thereby without creating objectionable properties therein such as web heaviness or weakness or non-uniformity of fiber distribution.

Although the present invention will be described in greater particularity with regard to picker laps and their processing in textile carding machines, such is primarily illustrative only, and the invention in its broader aspects is applicable to fibrous materials in sheet, lap, web or similar form and their processing in textile or related machines, in general.

Illustrative of such other forms of fibrous materials are fiber-oriented or isotropic fibrous sheets such as card webs, air- or liquid-laid sheets, etc.

The fibers of such laps, webs, or sheets may be of textile length, that is, they may be about one-half inch or greater in length, such as cardable cotton and rayon fibers, or they may be less than textile length, that is,

they may be less than about one-half inch and normally non-cardable, such as woodpulp fibers, cotton linters, etc. Various blends and mixtures of various lengths and proportions by weight of such fibers are also of use.

Also, the fibrous materials will be described more specifically herein as comprising cellulosic fibers such as cotton or viscose rayon. Such, however, is illustrative, and other cellulosic or vegetable fibers as well as animal or mineral fibers, both natural or synthetic, may be used. Illustrative of such other fibers are natural fibers such as flax, wool, etc.; synthetic fibers including cellulose esters such as cellulose acetate and cellulose triacetate, polyamide fibers such as nylon 6/6 and 6 polyester fibers such as "Dacron" and "Kodel," acrylic fibers such as "Orlon" and "Acrilan," modacrylic fibers such as "Dynel" and "Verel," vinylidene fibers such as saran, vinyl fibers such as "Vinyon," polyolefin fibers such as polypropylene, etc.

In the accompanying drawings and following specification, there is illustrated and described a preferred method and design of machine embodying the invention but it is to be understood that the invention in its broader aspects is not to be considered limited to the construction illustrated and described except as determined by the scope of the appended claims. Referring to the accompanying drawings,

FIGURE 1 is a fragmentary, partially cut-away plan view of apparatus including the improvements of the present invention, with some elements of relatively minor importance being omitted for purposes of clarity of illustrating the invention;

FIGURE 2 is a fragmentary, partially cut-away elevational view of the apparatus of FIGURE 1, taken on the line 2—2 thereof, looking in the direction indicated by the arrows;

FIGURE 3 is a fragmentary, cross-sectional view taken on the line 3—3 of FIGURE 1; and

FIGURE 4 is a fragmentary, cross-sectional view taken on the line 4—4 of FIGURE 3.

In the embodiment of the invention shown in the drawings and with particular reference to FIGURES 1 and 2 thereof, a textile card **10** is shown, at the back of which is positioned a picker lap L.

The picker lap L is a conventional, commercially-available lap of a continuous, considerably-compressed sheet of cotton tufts which is rolled under pressure into a substantially cylindrical package about 40 to 45 inches long by 15 to 18 inches in diameter, usually weighing from about 40 to about 50 pounds, or about 12 to 16 ounces per running yard.

The particular picker lap L illustrated in the drawings is about 45 inches wide. This is not a precise measurement, nor are any of the width measurements of any fibrous sheet materials described herein. This lack of preciseness is understandable due to the fuzziness and unevenness of the edges of such fibrous sheet materials. As used herein, such measurements are accurate to only within about plus or minus one-half inch.

The textile card **10** illustrated is about 60 inches wide and is conventional insofar as the parts thereof, subsequent to the feed plate and feed roll, are concerned. Some parts thereof, however, prior to the feed plate and feed roll, are modified to some degree.

The picker lap L is positioned at the back of the textile card **10** by a rod **12** (see FIGURE 2) which is slidably

mounted in vertical slots **14** formed in lap plates **16** mounted on extensions of the card frame **20**. The rod **12** positions the picker lap L directly over and in rolling contact with a rotatable lap roll **18** which is rotatably mounted in bearings **17** provided in the extension of the card frame **20**. The bearings **17** are adjustably mounted in slidable brackets **15** in the frame extensions whereby they are capable of forward or rearward adjustment. The shaft of the lap roll **18** extends beyond the extensions of the card frame **20** and a rotatable pulley **22** mounted on the end thereof is driven by a belt **24** driven by a suitable driving means (not shown).

The rotatable lap roll **18** is thus in driving contact with the picker lap L and slowly rotates the same whereby it is gradually unwound in somewhat conventional manner in the direction indicated in the drawings.

The cylindrical surface of the lap roll **18** has formed therein a plurality of grooves **19** into which are fitted a plurality of endless, flexible belts **30**. The other ends of the belts **30** are trained over a plurality of individual directional rolls **32** (see FIGS. 3–4) which are positioned on a plurality of shafts **31** mounted in a plurality of individual bifurcated brackets **34** extending upwardly in spaced relationship from a conventional feed plate **36**. The individual brackets **34** are rotatably adjustable whereby they are capable of so positioning the rollers **32** that they rotate in the direction of movement of the long axis of the fibrous web.

Consideration of FIGURES 1 and 2 will reveal that the lap which is unwound from the picker lap L advances in the direction of the long axis of the lap but moves angularly in the direction of the card **10** and is carried in such angular direction by the plurality of belts **30**. If the fibrous material is an oriented card web, then it can be stated that it is being advanced in the direction of its predominant fiber orientation and angularly toward the card.

The acute angle between the direction of movement of the long axis of the fibrous lap being fed to the card and the machine direction of movement of the fibrous lap as it is processed through the card is indicated by the angle α. As illustrated, angle α is about 41½°.

An analysis of the trigonometry involved will readily indicate that the width of the fibrous product being processed by the wider textile card, when multiplied by the cosine of the angle α, substantially equals the width of the narrower picker lap being fed to the card. As a consequence, therefore, it is a relatively simple matter to measure the width of the picker lap and, since the width of the textile card is known, to determine the acute angle at which to feed the lap whereby, even though it is narrower than the textile card, it nevertheless fills the entire width thereof.

The present invention is being described with particular reference to the feeding of a 45-inch picker lap to a 60-inch carding machine. Such, however, is merely for purposes of illustration and the invention in its broader aspects is not limited thereto. Narrower or wider sheets of fibrous material may be employed and narrower or wider textile processing machines may be used. For example, a 30-inch wide sheet of fibrous material may be fed to a 60-inch wide textile processing machine. It is relatively simple to figure out that, if it is desired to process a full width 60-inch product in the textile processing machine, the angle α should be 60°. Similarly, if it is desired to process a 20-inch wide sheet material in a 45-inch wide textile machine to create a 45-inch product, then angle α will be about 63½°.

Theoretically, any acute angle greater than 0° and less than 90° is utilizable. However, within the limits of the commercial aspects of the present invention, acute angles of from about 20° to about 80° are contemplated, with the most common usages being noted between about 30° and about 65°.

The lap is carried forwardly by the plurality of conveyor belts **30** and passes over the plurality of carrying rollers **32**, being pressed thereagainst by a plurality of pressure rollers **38** rotating on shafts **39**. This will control and keep the lap in proper position as it is being advanced angularly toward the textile card. The individual pressure rollers **38** are individually mounted in a plurality of bifurcated brackets **40** which are resiliently urged by springs **42** in the direction of the lap. The brackets **40** are also individually rotatable adjustable whereby their direction of rotation is in the direction of movement of the axis of the fibrous web towards the card.

The carrying rolls **32** and the pressure rolls **38** are directly opposed to each other and closely control and direct the movement of the web angularly towards the card at a point very close to the card. Such insures an even and uniform feeding of the web with a minimum of side-slippage.

After the lap has passed beyond the end of the belts **30**, it is guided upon the feed plate **36** and under a conventional feed roll **44** to a licker-in **46** to be processed in conventional manner on a main card cylinder **48**.

As used herein, an "acute angle" is an angle greater than 0° and less than 90°. The term is not intended to include angles of 0° or 90°. Also, as used herein, the width of a sheet of fibrous materials is its width, as measured in the cross direction directly across the sheet substantially at right angles to the direction of movement of the sheet. And, the width of a textile processing machine is the width of the widest sheet it is capable of handling. Such width measurement is in the cross direction and is substantially at right angles to the machine direction in which the sheet moves in travelling through the machine.

The direction of movement of the fibrous materials as they are being fed to the textile processing machine is relatively simple to determine inasmuch as the fibrous materials move substantially in a single plane created by the upper surfaces of the conveyor belts **30**. This direction is illustrated in FIGURE 1 as the "Fiber Feed". The direction of movement of the fibrous materials within the textile processing machine is more difficult to determine and it is basically circular in nature, as it moves from one rotatable processing roll to another. However, all through this circular movement, the path of any individual fiber lies in a single vertical plane which, if projected onto a horizontal plane, is a straight line extending in the machine direction. This straight line is referred to herein as the direction of movement of the fibrous materials within the textile processing machine and is illustrated in FIGURE 1 as "Fiber Processing."

The invention will be further illustrated in greater detail by the following specific examples. It should be understood, however, that although these examples may describe in particular detail some of the more specific features of the invention, they are given primarily for purposes of illustration and the invention in its broader aspects is not to be construed as limited thereto.

Example I

The picker lap is a 45-inch, 45-pound, 13-ounce lap of cotton fibers. It is fed to the textile card illustrated in the drawings at an angle of about 41½° to the direction of movement of the feed roll. The lap is processed in the textile card and the resulting card web measures about 60 inches in width as it is removed from the main card cylinder by a conventional doffing comb. There is no line of weakness in the longitudinal direction in the card web and fiber uniformity is excellent.

Example II

The procedures set forth in Example I are followed substantially as set forth therein with the exception that the picker lap is 40 inches wide. The angle of feed of the picker lap is maintained at an angle of about 41½° to the direction of movement of the feed roll. The resulting card web measures about 53⅓ inches in width

as it is removed from the card cylinder by a conventional doffing comb. There is no line of weakness extending longitudinally in the card web and the fiber uniformity is excellent.

The example illustrates that it is not essential that the entire width of the textile card be employed but that the principles of the present inventive concept are equally applicable when only a portion of its width is utilized. In this way, a web narrower than the full width of the card can be produced whereby losses due to edge-trimming or "trim-waste" can be minimized.

Example III

The procedures of Example I are followed substantially as set forth therein with the exception that the picker lap measures only about 40 inches in width. It is fed to the textile card illustrated in the drawings at an angle of about 48° to the direction of movement of the feed roll. The lap is then processed in the textile card and the resulting card web measures about 60 inches in width as it is removed from the main card cylinder by a conventional doffing comb. There is no line of weakness in the card web and the fiber uniformity is excellent.

Examples IV, V and VI

The procedures set forth in Examples I, II and III are followed substantially as set forth therein with the exception that the picker lap comprises viscose rayon fibers having a denier of 1½ and a staple length of 1$^{9}/_{16}$ inches. The results are comparable.

Although several specific examples of the inventive concept have been described, the same should not be construed as limited thereby nor to the specific features mentioned therein but to include various other equivalent features as set forth in the claims appended hereto. It is understood that any suitable changes, modifications and variations may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A method of continuously feeding a rolled unitary sheet of fibrous materials having a predetermined width to a textile processing machine having a width greater than that of the unitary sheet of fibrous materials which comprises: positioning a rolled unitary sheet of fibrous material at an acute angle to the feed end of the textile processing machine, continuously unwinding the rolled unitary sheet of fibrous material, feeding the unwound unitary sheet of fibrous material angularly to the textile processing machine at such an acute angle thereto that the width of the product being processed by the textile processing machine multiplied by the cosine α substantially equals the width of the unitary sheet of fibrous material being fed to the textile processing machine, wherein α equals the acute angle between the direction of movement of the fibrous material being fed to the textile processing machine and the direction of movement of the fibrous material being processed in the textile processing machine, and controlling the width of the fibrous material immediately prior to its being fed to the textile processing machine.

2. A method of continuously feeding a rolled unitary sheet of fibrous materials having a predetermined width to a textile processing machine having a width greater than that of the unitary sheet of fibrous materials which comprises: positioning a rolled unitary sheet of fibrous material at an acute angle to the feed end of the textile processing machine, continuously unwinding the rolled unitary sheet of fibrous material, feeding the unwound unitary sheet of fibrous material angularly to the textile processing machine at such an acute angle thereto that the width of the product being processed by the textile processing machine multiplied by the cosine α substantially equals the width of the unitary sheet of fibrous material being fed to the textile processing machine, wherein α equals the acute angle between the direction of movement of the fibrous material being fed to the textile processing machine and the direction of movement of the fibrous material being processed in the textile processing machine, and controlling the width of the fibrous material immediately prior to its being fed to the textile processing machine by exerting a series of substantial forces on the sheet of fibrous material as it passes a point close to where it is initially processed by the textile processing machine.

3. A method of continuously feeding a rolled unitary sheet of fibrous materials having a predetermined width to a textile processing machine having a width greater than that of the unitary sheet of fibrous materials which comprises: positioning a rolled unitary sheet of fibrous material at an acute angle to the feed end of the textile processing machine, continuously unwinding the rolled unitary sheet of fibrous material, feeding the unwound unitary sheet of fibrous material angularly to the textile processing machine at such an acute angle thereto that the width of the product being processed by the textile processing machine multiplied by the cosine α substantially equals the width of the unitary sheet of fibrous material being fed to the textile processing machine, wherein α equals the acute angle between the direction of movement of the fibrous material being fed to the textile processing machine and the direction of movement of the fibrous material being processed in the textile processing machine, and controlling the width of the fibrous material immediately prior to its being fed to the textile processing machine by exerting a series of forces on the fibrous material in a direction which is perpendicular to the surface of the fibrous material and in a direction which is parallel to the surface of said material.

4. Apparatus for continuously feeding a rolled unitary sheet of fibrous material having a predetermined width to a textile processing machine having a width greater than that of the unitary sheet of fibrous material which comprises: means for positioning a rolled sheet of fibrous material so that the direction of movement of the unitary sheet of fibrous material as it is unwound from the roll is at an acute angle to the direction of movement of the fibrous material being processed in the textile processing machine, means for unwinding the unitary sheet of fibrous material from the roll and feeding the unitary sheet of fibrous material angularly to the textile processing machine at such an acute angle thereto that the width of the product benig processed by the textile processing machine multiplied by the cosine α substantially equals the width of the sheet of fibrous material being fed to the textile processing machine, wherein α equals the acute angle between the direction of movement of the fibrous material being fed to the textile processing machine and the direction of movement of the fibrous material being processed in the textile processing machine, and a series of juxtaposed rollers positioned close to the textile processing machine and cooperating with said means for unwinding and feeding whereby the width of the fibrous material is controlled immediately prior to its being fed to the textile processing machine.

5. Apparatus for continuously feeding a rolled unitary sheet of fibrous material having a predetermined width to a textile processing machine having a width greater than that of the unitary sheet of fibrous material which comprises: means for positioning a rolled unitary sheet of fibrous material so that the direction of movement of the unitary sheet of fibrous material as it is unwound from the roll is at an acute angle to the direction of movement of the fibrous material being processed in the textile processing machine, a plurality of narrow conveyor belts disposed at said acute angle to the textile processing machine for unwinding the unitary sheet of fibrous material from the roll and feeding the sheet of fibrous material angularly to the textile processing machine at such an acute angle thereto that the width of

the product being processed by the textile processing machine multiplied by the cosine α substantially equals the width of the sheet of fibrous material being fed to the textile processing machine, wherein α equals the acute angle between the direction of movement of the fibrous material being fed to the textile processing machine and the direction of movement of the fibrous material being processed in the textile processing machine, and a series of juxtaposed rollers positioned close to the textile processing machine and the cooperating with said narow conveyor belts whereby the width of the fibrous material is controlled immediately prior to its being fed to the textile processing machine.

References Cited by the Examiner

UNITED STATES PATENTS

109,634	11/1870	Lawton	19—160
311,948	2/1885	Bramwell	19—160
512,443	1/1894	Kershaw	19—163
534,418	2/1895	Bates	19—160

FOREIGN PATENTS

60,238	12/1891	Germany.
1,225	of/1898	Great Britain.
224,188	2/1943	Switzerland.

DONALD W. PARKER, *Primary Examiner.*