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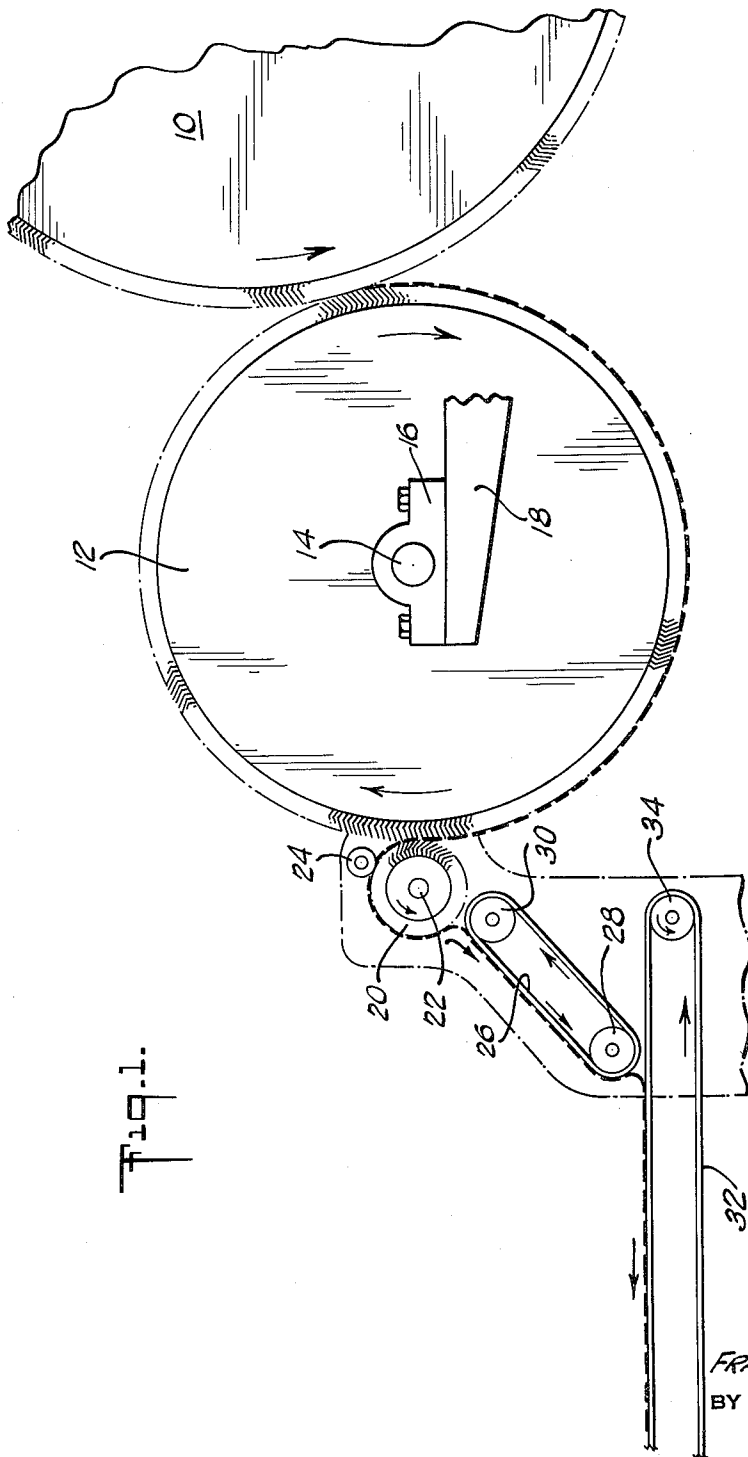
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METHODS FOR DOFFING AND DRAFTING TEXTILE FIBERS

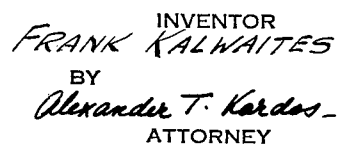
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2 Sheets-Sheet 1



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METHODS FOR DOFFING AND DRAFTING TEXTILE FIBERS

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2 Claims. (Cl. 19—106)

The present invention relates to the doffing or removing of textile fibers from rotatable surfaces, such as from the doffing cylinder of a card, for example, and more particularly is concerned with the doffing of such fibers and the simultaneous drafting or drawing thereof to increase their orientation in the long or machine direction.

In the processing of textile fibers whereby they are converted from a naturally-occurring, intermatted fibrous mass into relatively uniform, fibrous textile materials having a predominant fiber orientation in the long direction thereof, the individual fibers are initially separated and formed into a fibrous web on a card. This web, in which the individual fibers are relatively aligned generally in the long direction thereof, is doffed or removed from the doffing cylinder of the card, usually by a rapidly reciprocating doffer comb, and is then further processed, as desired or required, such as by being drafted or drawn, whereby the orientation of the fibers in the long direction of the web is increased.

During the removal of the fibers from the doffing cylinder by means of the reciprocating comb, the fiber orientation or alignment thereof is increased to a limited extent and, therefore, subsequent drafting or drawing operations are required to increase the orientation or alignment of the individual fibers in the web. These subsequent drafting or drawing operations have had so much orienting or aligning of the fibers to do to produce the desired highly oriented web that difficulties in these operations ensued.

In accordance with the present invention, individual fibers in a web are removed from the doffing cylinder of a card machine, or from like rotatable surfaces, in a manner which considerably increases the fiber orientation in the resulting web. Thus, in the present invention, the fibers are removed from the doffing cylinder by a substantially simultaneous doffing and drafting operation. In consequence, a more highly oriented web is obtained and subsequent operations to increase the orientation are minimized and thereby greatly facilitated and expedited.

The more highly oriented web may be obtained in accordance with the invention by initially providing a carded fibrous web on a rotatable surface such as the doffing cylinder of a card machine, positioning a second rotatable surface such as a rotatable stripper roll, adjacent to but spaced from the doffing cylinder by a predetermined distance, and then rotating the doffing cylinder and the stripper roll to effect the transfer of the card web from the doffing cylinder to the stripper roll. At the same time, by having the stripper roll rotate with a greater peripheral surface linear velocity than that of the doffing cylinder, the card web is simultaneously drafted or drawn during its transfer and the fibers therein become more highly oriented or aligned in the long direction, thereby making the resulting highly oriented web more suitable for further processing.

The fibrous web or layer which is processed to form the products of this invention may contain natural or synthetic, vegetable, animal or mineral fibers such as cotton, silk, wool, vicuna, mohair, alpaca, flax, ramie, jute, etc.; synthetic or man-made fibers such as the cellulosic fibers, notably cuprammonium, viscose or regenerated

2

cellulose fibers; cross-linked cellulosic fibers such as "Corval" and "Topel"; cellulose ester fibers such as cellulose acetate ("Celanese") and cellulose tri-acetate ("Arnel"); the saponified cellulose ester fibers such as "Fortisan" and "Fortisan-36"; the polyamide fibers such as nylon 420, nylon 6 (polycaprolactam), nylon 66 (hexamethylene diamine-adipic acid), nylon 610 (hexamethylene diamine-sebacic acid), nylon 11 (11-amino undecanoic acid "Rilsan"); protein fibers such as "Vicara"; halogenated hydrocarbon fibers such as "Teflon" (polytetrafluoroethylene); hydrocarbon fibers such as polyethylene, polypropylene, polybutadiene and polyisobutylene; polyester fibers such as "Kodel" and "Dacron"; vinyl fibers such as "Vinyon" and saran; dinitrile fibers such as "Darvan"; nitrile fibers such as "Zefran"; acrylic fibers such as "Dynel," "Verel," "Orlon," "Acrilan," "Creslan," etc.; mineral fibers such as glass, metal; etc.

The lengths of the fibers in the starting fibrous web may vary from about $\frac{3}{8}$ inch or $\frac{1}{2}$ inch up to about $2\frac{1}{2}$ inches or more in length, depending upon the particular properties and characteristics required or desired in the resulting fibrous web. If desired, the fibrous layer may have added thereto, by a subsequent processing step, from about 1 or 2% by weight up to about 100% by weight but preferably less than about 50% by weight, of fibers other than those of textile length. These other fibers may be of papermaking length, which extend from about $\frac{3}{8}$ inch in length down to about $\frac{1}{16}$ of an inch or less in length, which shorter fibers normally are not used in conventional methods of producing fibrous webs.

Illustrative of these short papermaking fibers are the natural cellulosic fibers such as woodpulp and wood fibers, cotton linters, cotton hull shavings fibers, mineral fibers such as asbestos, glass, rock wool, etc., or any of the hereinbefore-mentioned natural or synthetic fibers in lengths less than about $\frac{3}{8}$ inch and down to about $\frac{1}{16}$ of an inch or less.

The denier of the individual synthetic fibers referred to above is preferably in the range of the approximate thickness of the natural fibers mentioned and consequently deniers in the range of from about 1 to about 5 are preferred. Where greater opacity or greater covering power is desired, special fiber deniers of down to about $\frac{3}{4}$ or even about $\frac{1}{2}$ may be employed. Where desired, deniers of up to about 5.5, 6, 8, 10, 15, or higher, may be used. The minimum and maximum denier are naturally dictated by the desires or requirements for producing a particular fibrous web, by the machines and methods for producing the same, and so forth.

The weight of the fibrous web or layer of starting material on the doffing cylinder may be varied within relatively wide limits above a predetermined minimum value, depending upon the requirements of the intermediate or the final products. A single, thin web of fibers, such as produced by a card and as presented by the doffing cylinder, may have a weight of from about 30 to about 250 or more grains per square yard and may be used in the application of the principles of the present invention. Within the more commercial aspects of the present invention, however, web weights on the doffing cylinder of from about 60 grains per square yard to about 175 grains per square yard are contemplated. If heavier web weights are desired, such as up to 1800 grains, for example, several of the individual webs may be combined into a laminated structure to obtain the desired weight. The product of one doffing cylinder may be folded, doubled, tripled, etc., on itself to reach the heavier weight, or a plurality of cards may be used and the individual products stacked or laminated for a similar purpose.

The invention will be more fully understood from the description which follows, taken in conjunction with the

accompanying drawings in which there are illustrated preferred designs of machines and modes of operation embodying the invention. It is to be understood, however, that the invention is not to be considered limited to the constructions disclosed except as determined by the scope of the appended claims. In the drawings:

FIGURE 1 is a simplified, fragmentary, schematic view in elevation showing one embodiment of the general principles of operation of the present invention; and

FIGURE 2 is a simplified, fragmentary, schematic view in elevation showing another embodiment of the general principles of operation of the present invention.

In the embodiment of the invention illustrated in FIGURE 1 of the drawings, a conventional textile card is used and comprises a conventional rotatable main card cylinder 10 which is used to provide for the normal carding of the fibers fed to the card whereby the fibers are disentangled and the bunches or tufts of fiber are separated more or less into individual fibers. The initial attenuating of the fibers into a generally aligned condition takes place on the surface of the main cylinder 10 and the individualized fibers are sparsely spread over the rotating surface in an amount weighing but a few grains per square yard.

These substantially individualized fibers which do not normally constitute a self-sustaining fibrous web are presented to a doffing cylinder 12 which rotates on a shaft 14 mounted in bearings 16 secured to the card frame 18. The doffing cylinder 12 rotates at a much lower peripheral surface linear speed than the main cylinder 10, in accordance with standard conventional practice. This speed differential which may be varied, as desired, creates a condensing of the individual fibers into a thin, fibrous carded web normally weighing from about 30 grains to about 250, and preferably from about 60 to about 175 grains per square yard, on the peripheral surface of the rotatable doffing cylinder 12.

The main cylinder 10 and the doffing cylinder 12 are structurally conventional; the main cylinder being about 50 inches in outside diameter and about 45 inches wide; and the doffing cylinder being about 26 or 27 inches in outside diameter and also about 45 inches wide.

The doffing cylinder may be covered with conventional fillets which are continuous strips of narrow card clothing, $1\frac{1}{2}$ or 2 inches wide, and long enough to entirely helically wrap around and cover the cylindrical surface of the doffing cylinder. The conventional bent wires penetrate the heavy fabric foundation of the fillet card clothing and protrude therefrom in the usual way whereby doffing and stripping functions are possible. If desired, however, the doffing cylinder may be covered with conventional metallic card clothing which consists of a steel band with teeth punched or otherwise formed in one side and usually a thick rib on the other side. This steel band is wound helically around the surface of the cylinder, on edge, so that each coil fits closely against the preceding coil, thus producing a cylindrical surface entirely covered with fine saw-tooth points whereby doffing and stripping functions are possible.

Immediately adjacent the doffing cylinder 12, and approximately at the position where the fibrous web formed thereon is conventionally removed by the usual textile doffing comb, there is located a cylindrical, rotatable stripper roll 20 rotating on a shaft 22 also mounted in the card frame. This stripper roll 20 has the same width as the doffing cylinder 12 but has a smaller diameter which is in the range of from about 2 inches to about 14 inches, and preferably from about 3 inches to about 10 inches. The stripper roll 20 is covered with card clothing such as conventional card fillets, although conventional metallic clothing is preferable for many operations. As illustrated in FIGURE 1, the stripper roll 20 is positioned at about the nine o'clock position of the doffing cylinder. This, however, as will be pointed out

hereinafter, is not essential and other locations are possible.

The stripper roll 20 is adjustably and accurately positioned with respect to the doffing cylinder 12 and the clearance between their peripheral surfaces is on the order of from about 0.005 inch to about 0.150 inch, and preferably from about 0.007 inch to about 0.060 inch, depending on the weight of the fibrous materials being processed and upon the nature and properties of the specific fibers involved. The direction of rotation of the stripper roll 20 is opposite to the direction of rotation of the doffing cylinder 12 and is counterclockwise, as illustrated by the directional arrow.

The purpose of the stripper roll 20 is to remove the fibrous web from the surface of the doffing cylinder 12 and simultaneously draft the fibers thereof into a desired degree of fiber orientation. In order to do so and accomplish the desired objects of the present invention, it has been established that, not only must the clearance between the rotatable peripheral surfaces be accurately maintained as described previously but the ratio of the peripheral surface linear velocity of stripper roll 20 to the doffing cylinder 12 must be greater than 1:1 and preferably at least 1.2:1 or 2:1. Higher ratios of up to 10:1 or 20:1, or higher, are obtainable and are useful in many instances, provided the uniformity and the identity of the fibrous web resulting from such high ratios is of such a nature that it can be satisfactorily employed in the desired use.

If the clearance between the rotatable surfaces is not maintained within the indicated ranges and if the peripheral surface linear velocity of the stripper roll 20 is decreased below the minimum value specified above, the fibers of the web on the doffing cylinder will not be satisfactorily transferred to the stripper roll and will not be properly drafted during such transfer and the objectives of the present invention will not be obtained.

The exact mechanism whereby the carded web is transferred from the doffing cylinder 12 to the stripper roll 20 and drafted during such transfer whereby the objectives of the present invention are realized has not been definitely established. However, it has been established that, when the proper clearance between the rotatable surfaces of stripper roll 20 and doffing cylinder 12 is maintained and the peripheral surface linear velocity of the stripper roll is greater than the peripheral surface linear velocity of the doffing cylinder, as hereinabove set forth, the objectives of the present invention are obtained.

In many cases, particularly when higher linear speed ratios are used, there is a considerable tendency for the drafted fibrous web on the stripper roll 20 to leave the surface of that rapidly rotating roll and return to the surface of the doffing cylinder 12. This is prevented by providing a pressure roll 24 in rolling, driven, pressing contact with the stripper roll 20, and positioning the same as close as possible to the periphery of the doffing cylinder and thus relatively close to the point of transfer of fibers from doffing cylinder 12 to stripper roll 20. Any tendency of the fibers to return to the doffing cylinder is thus defeated.

After the fibrous web has passed under the pressure roll 24, it proceeds around the periphery of the stripper roll 20 in the direction indicated until it is transferred onto a downwardly inclined conveyor belt 26 which is looped around driving pulley 28 and cooperating driven pulley 30. The clearance between the surface of the stripper roll 20 and the conveyor belt 26 is, of course, relatively small so that the fibrous web is transferred naturally from one to the other in accordance with known stripping principles.

The linear velocity of the conveyor belt 26 may be equal to or greater than or less than the peripheral surface linear velocity of the stripper roll to provide conditions of no draft, draft, or compaction, as desired, for purposes to be described more fully hereinafter.

The fibrous web is thus carried downwardly on the outer reach of the conveyor belt 26 in the direction indicated and is deposited upon the surface of the main conveyor belt 32 which is looped around a driving pulley (not shown) and cooperating driven pulley 34. The drafted web is then carried further and may be used either by itself or in combination with other webs or sheets in a laminated structure.

Examination of the fibrous web reveals that its fiber orientation in the long direction thereof has been considerably increased whereby subsequent drafting and drawing operations are minimized and, in some cases, omitted completely.

In FIGURE 2, there is illustrated a second embodiment of the general principles of operation of the present inventive concept. In this figure, a conventional textile card is used which comprises a conventional rotatable main card cylinder 10' which is used to provide for the normal carding of the fibers fed to the card. The substantially individualized fibers which are formed on the surface of the main card cylinder 10' are presented to a conventional doffing cylinder 12' which rotates on a shaft 14' mounted in bearings 16' secured to a card frame 18'. The doffing cylinder 12' rotates at a much lower peripheral surface linear speed than the main card cylinder 10' in accordance with standard conventional practice.

As described previously, the doffing cylinder 12' may be covered either with conventional card fillet clothing or conventional metallic card clothing.

Immediately adjacent the doffing cylinder 12' and located at approximately the seven o'clock position thereof, as viewed in FIGURE 2, there is located a cylindrical rotatable stripper roll 20' which rotates on a shaft 22' mounted in the card frame'. This stripper roll 20' has the same width as the doffing cylinder 12' but has a smaller diameter which is in the range of from about 2 inches to about 16 inches and preferably from about 8 inches to about 14 inches. The stripper roll 20' is covered with card clothing such as conventional card fillets, although conventional metallic clothing is preferable for many operations. Such conventional card clothing has been described previously.

The stripper roll 20' is adjustably and accurately positioned with respect to the doffing cylinder 12' and the clearance between their peripheral surfaces is on the order of from about 0.005 inch to about 0.150 inch and preferably from about 0.007 inch to about 0.060 inch, depending upon the weight of the fibrous web being processed and upon the nature and properties of the specific fibers being used. The direction of rotation of the stripper roll 20' is opposite to the direction of rotation of the doffing cylinder 12' and is counterclockwise, as illustrated by the directional arrow.

The purpose of the stripper roll 20' is similar to that of the previously described stripper roll 20, namely, to remove the fibrous web from the surface of the doffing cylinder and simultaneously draft the fibers thereof into the desired degree of fiber orientation. The clearance between the rotatable peripheral surfaces must be accurately maintained as set forth hereinbefore and the ratio of the peripheral surface linear velocity of the stripper roll to the doffing cylinder must also be maintained within the ratios previously described.

As shown in FIGURE 2, the stripper roll 20' is considerably larger in diameter than the stripper roll 20 of FIGURE 1. Such a diameter creates a longer arc of close proximity between the doffing cylinder and the stripper roll to provide for a better levelling action whereby a smoother-appearing fibrous web is obtained.

A rotatable pressure roll 24' mounted on a lever 25' is provided in order to press the fibrous web against the stripper roll 20' to prevent any tendency thereof to leave the stripper roll 20' and return to the doffing cylinder. The function of the pressure roll 24' in FIGURE 2 is

thus very similar to the function of the pressure roll 24 in FIGURE 1.

After the fibrous web has passed under the pressure roll 24', it proceeds around the periphery of the stripper roll 20' in the direction indicated until it is removed therefrom and is deposited upon a smooth-faced transition roll 26' rotatably mounted upon a shaft 28'. This transition roll 26' is positioned sufficiently close to the stripper roll 20' so that the fibrous web is naturally transferred from one surface to the other in accordance with known practice.

The smooth-faced transition roll 26' is driven independently of the stripper roll 20' and may be driven with any desirable velocity ratio with respect to the stripper roll. For example, if the smooth-faced transition roll rotates with the same peripheral surface linear velocity as the stripper roll 20', the transition roll merely performs a web-removal no-draft role. However, if the transition roll is rotated with a peripheral surface linear velocity which is less than that of the stripper roll, the fibrous web being transferred is compacted and condensed according to this ratio. In this way, the transition roll provides a stripping and condensing action. If on the other hand, the transition roll 26' is rotated with a peripheral surface linear velocity greater than the stripper roll 20', there is accomplished a corresponding drafting of the fibrous web as it is removed from the stripper roll 20'. The limits of the drafting of the web at this point are, of course, affected by the smoothness of the transition roll 26' in that, if the transition roll 26, rotates at too high a velocity, the fibrous web will not be drafted correspondingly inasmuch as there will be a slipping or sliding action of the web on the smooth surface of the transition roll 26'.

In this way, compacting or drafting at a second stage is provided whereby condensing or drafting up to about 20% may be realized, independently of the action taken by the stripper roll in removing the fibrous web from the doffing cylinder. Such action is, of course, also possible with the apparatus of FIGURE 1 by selecting a desired velocity of the conveyor belt 26.

The fibrous web is then carried downwardly around the surface of the transition roll 26' and is transferred to the surface of a main conveyor belt 32' which is driven on pulleys 34'. The surface of the conveyor belt 32' is sufficiently close to the surface of the transition roll so that the fibrous web can be gently deposited thereon. The drafted web may be used either by itself or in combination with other webs or sheets in a laminated structure.

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 1

The starting fibrous material, as present on the surface on the doffing cylinder, is a 45-inch wide card web of viscose rayon staple fibers, weighing about 75 grains per square yard and containing fibers having a length of about $1\frac{1}{16}$ inches and a denier of about $1\frac{1}{2}$. The peripheral surface linear velocity of the doffing cylinder is 20 yards per minute. The doffing cylinder is covered with metallic clothing having 11 points per inch with 26 wraps per inch on the cylinder, as measured in the axial direction thereof.

The fibrous web is transferred to a stripper roll positioned as illustrated in FIGURE 1 and accurately spaced 0.030 inch from the doffing cylinder. The stripper roll has a peripheral surface liner velocity of 25 yards per minute. This is equivalent to a 1.25:1 velocity ratio between the doffer and the stripper. The diameter of the stripper roll is $3\frac{1}{2}$ inches and it is covered with metallic clothing

having $7\frac{1}{2}$ points per inch with about 22 wraps per inch on the roll, as measured in the axial direction thereof.

Examination of the fibrous web being delivered from the stripper roll reveals that the drafted web has a weight of about 60 grains per square yard and a much higher degree of fiber orientation than that present in a similar fibrous web prepared from similar materials on similar equipment but removed from the doffing cylinder by a conventional doffing comb. It is well suited for further processing and spinning into yarn.

Example II

The starting fibrous material, as delivered from the doffing cylinder to the stripping cylinder, is a 45-inch wide card web of 50% cotton and 50% viscose rayon staple fibers, weighing about 75 grains per square yard, the rayon fibers having a length of about $1\frac{1}{16}$ inches and a denier of about $1\frac{1}{2}$. The peripheral surface linear velocity of the doffing cylinder is 20 yards per minute. The doffing cylinder is covered with metallic clothing having 11 points per inch with 26 wraps per inch on the cylinder, as measured in the axial direction thereof.

The fibrous web is transferred to a stripper roll positioned as illustrated in FIGURE 1 and accurately spaced 0.020 inch from the doffing cylinder. The stripper roll has a peripheral surface linear velocity of 40 yards per minute. This is equivalent to a 2:1 ratio between the doffer and the stripper. The diameter of the stripper roll is 7 inches and it is covered with metallic clothing having $7\frac{1}{3}$ points per inch with about 24 wraps per inch on the roll, as measured in the axial direction thereof.

Examination of the fibrous web being delivered by the stripper reveals that the drafted web has a weight of about 38 grains per square yard and a much higher degree of fiber orientation than that present in a similar fibrous web prepared from similar materials on similar equipment but removed from the doffing cylinder by a conventional doffing comb. It is well suited for further processing and spinning into yarn.

Example III

The starting fibrous material, as delivered from the doffing cylinder, is a 45-inch wide card web of cotton fibers, weighing about 100 grains per square yard and containing fibers having a length of about $1\frac{1}{16}$ inches. The peripheral surface linear velocity of the doffing cylinder is 20 yards per minute. The doffing cylinder is covered with metallic clothing having 11 points per inch with 26 wraps per inch on the cylinder, as measured in the axial direction thereof.

The fibrous web is transferred to a stripper roll positioned as illustrated in FIGURE 1 and accurately spaced 0.015 inch from the doffing cylinder. The stripper roll has a peripheral surface linear velocity of 50 yards per minute. This is equivalent to a $2\frac{1}{2}$:1 ratio between the stripper roll and the doffing cylinder. The diameter of the stripper roll is 7 inches and it is covered with metallic clothing having $7\frac{1}{3}$ points per inch with about 24 wraps per inch on the roll as measured in the axial direction thereof.

Examination of the fibrous web reveals that the drafted web has a weight of about 40 grains per square yard and a much higher degree of fiber orientation than that present in a similar fibrous web prepared from similar materials on similar equipment but removed from the doffing cylinder by a conventional doffing comb. It is well suited for further processing and spinning into yarn.

Example IV

The starting fibrous material, as delivered from the doffing cylinder, is a 45-inch wide card web of viscose rayon staple fibers, weighing about 90 grains per square yard and containing fibers having a length of about $1\frac{1}{16}$ inches and denier of about $1\frac{1}{2}$. The peripheral surface linear velocity of the doffing cylinder is 20 yards per min-

ute. The doffing cylinder is covered with metallic clothing having 11 points per inch with 26 wraps per inch on the cylinder, as measured in the axial direction thereof.

The fibrous web is transferred to a stripper roll positioned as illustrated in FIGURE 1 and accurately spaced 0.035 inch from the doffing cylinder. The stripper roll has a peripheral surface linear velocity of 30 yards per minute. This is equivalent to a $1\frac{1}{2}$:1 ratio between the stripper roll and the doffing cylinder. The diameter of the stripper roll is $3\frac{1}{2}$ inches and it is covered with metallic clothing having $7\frac{1}{2}$ points per inch with about 22 wraps per inch on the roll, as measured in the axial direction thereof.

Examination of the fibrous web reveals that the drafted web has a weight of about 60 grains per square yard and a much higher degree of fiber orientation than that present in a similar fibrous web prepared from similar materials on similar equipment but removed from the doffing cylinder by a conventional doffing comb. It is well suited for further processing into a nonwoven fabric suitable for use as a cover or wrapper for sanitary napkins.

Example V

The starting fibrous material, as delivered from the doffing cylinder, is a 45-inch wide card web of viscose rayon staple fibers, weighing about 75 grains per square yard and containing fibers having a length of about $1\frac{1}{16}$ inches and a denier of about $1\frac{1}{2}$. The peripheral surface linear velocity of the doffing cylinder is 20 yards per minute. The doffing cylinder is covered with metallic clothing having 11 points per inch with 26 wraps per inch on the cylinder, as measured in the axial direction thereof.

The fibrous web is transferred to a stripper roll positioned as illustrated in FIGURE 2 and accurately spaced 0.030 inch from the doffing cylinder. The stripper roll has a peripheral surface linear velocity of 25 yards per minute. This is equivalent to a 1.25:1 ratio. The diameter of the stripper roll is $12\frac{3}{4}$ inches and it is covered with metallic clothing having $7\frac{1}{2}$ points per inch with about 22 wraps per inch on the roll, as measured in the axial direction thereof. A smooth-faced transition roll having a diameter of 6 inches is used to transfer the drafted web to the conveyor belt. The transition roll has a peripheral surface linear velocity of 27 yards per minute whereby there is a slight drafting or speed differential between the stripper roll and the transition roll.

Examination of the fibrous web from the stripper roll reveals that the drafted web has a weight of about 56 grains per square yard and a much higher degree of fiber orientation than that present in a similar fibrous web prepared from similar materials on similar equipment but removed from the doffing cylinder by a conventional doffing comb. It is well suited for further processing and spinning into yarn.

Example VI

The starting fibrous material, as delivered from the doffing cylinder, is a 45-inch wide card web of 50% cotton and 50% viscose rayon staple fibers, weighing about 75 grains per square yard, the rayon fibers having a length of about $1\frac{1}{16}$ inches and a denier of about $1\frac{1}{2}$. The peripheral surface linear velocity of the doffing cylinder is 20 yards per minute. The doffing cylinder is covered with metallic clothing having 11 points per inch with 26 wraps per inch on the cylinder, as measured in the axial direction thereof.

The fibrous web is transferred to a stripper roll positioned as illustrated in FIGURE 2 and accurately spaced 0.020 inch from the doffing cylinder. The stripper roll has a peripheral surface linear velocity of 40 yards per minute. This is equivalent to a 2:1 ratio. The diameter of the stripper roll is $12\frac{3}{4}$ inches and it is covered with metallic clothing having $7\frac{1}{3}$ points per inch with about 24 wraps per inch on the roll, as measured in the axial direction thereof. A smooth-faced transition roll having

a diameter of 6 inches is used to transfer the drafted web to the conveyor belt. The transition roll has a peripheral surface linear velocity of 37 yards per minute whereby there is a slight condensation or speed differential between the stripper roll and the transition roll.

Examination of the fibrous web reveals that the drafted web has a weight of about 40 grains per square yard and a much higher degree of fiber orientation than that present in a similar fibrous web prepared from similar materials on similar equipment but removed from the doffing cylinder by a conventional doffing comb. It is well suited for further processing and spinning into yarn.

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 doffing a fibrous web from a rotatable surface and substantially simultaneously drafting the same which comprises: carrying a fibrous web on a rotatable surface; transferring said fibrous web from said rotatable surface to a second rotatable surface closely adjacent to but spaced from said first-mentioned rotatable surface, said rotatable surfaces moving in the same direction at the point of closest adjacency with the ratio of the peripheral surface linear velocity of the second rotatable surface to that of the first-mentioned rotatable surface being in the range of from about $1\frac{1}{2}$:1 to about $2\frac{1}{2}$:1, whereby the fibrous web is doffed and substantially simultaneously drafted to become permanently more highly oriented in the long direction and to have its grain weight per square yard permanently reduced; and pressing the transferred fibrous web against the peripheral surface of the second rotatable surface at a point relatively close to the point of transfer of the fibrous web from the first-mentioned rotatable surface to the second rotatable surface to enable the fibrous web to be drafted during its transfer from the first-mentioned rotatable surface and to prevent its return thereto.

2. A method of doffing a fibrous web from a rotatable surface and substantially simultaneously drafting the same which comprises: carrying a fibrous web on a rotatable surface; transferring said fibrous web from said rotatable surface to a second rotatable surface closely adjacent to but spaced from said first-mentioned rotatable surface, said rotatable surfaces moving in the same direction at the point of closest adjacency with the ratio of the peripheral surface linear velocity of the second rotatable surface to that of the first-mentioned rotatable surface being in the range of from about $1\frac{1}{2}$:1 to about 20:1, whereby the fibrous web is doffed and substantially simultaneously drafted to become permanently more highly oriented in the long direction and to have its grain weight per square yard permanently reduced; and pressing the transferred fibrous web against the peripheral surface of the second rotatable surface at a point relatively close to the point of transfer of the fibrous web from the first-mentioned rotatable surface to the second rotatable surface to enable the fibrous web to be drafted during its transfer from the first-mentioned rotatable surface and to prevent its return thereto.

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