COMPOSITE FIBRID YARNS AND METHOD OF MANUFACTURE

Filed Nov. 24, 1969 3 Sheets-Sheet 1

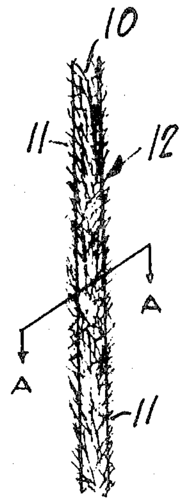

FIG. 1

FIG. 2

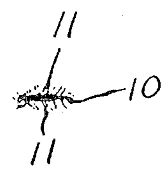

FIG. 3

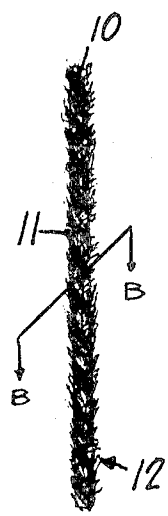

FIG. 4

FIG. 5

FIG. 6

FIG.7

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COMPOSITE FIBRID YARNS AND METHOD OF MANUFACTURE

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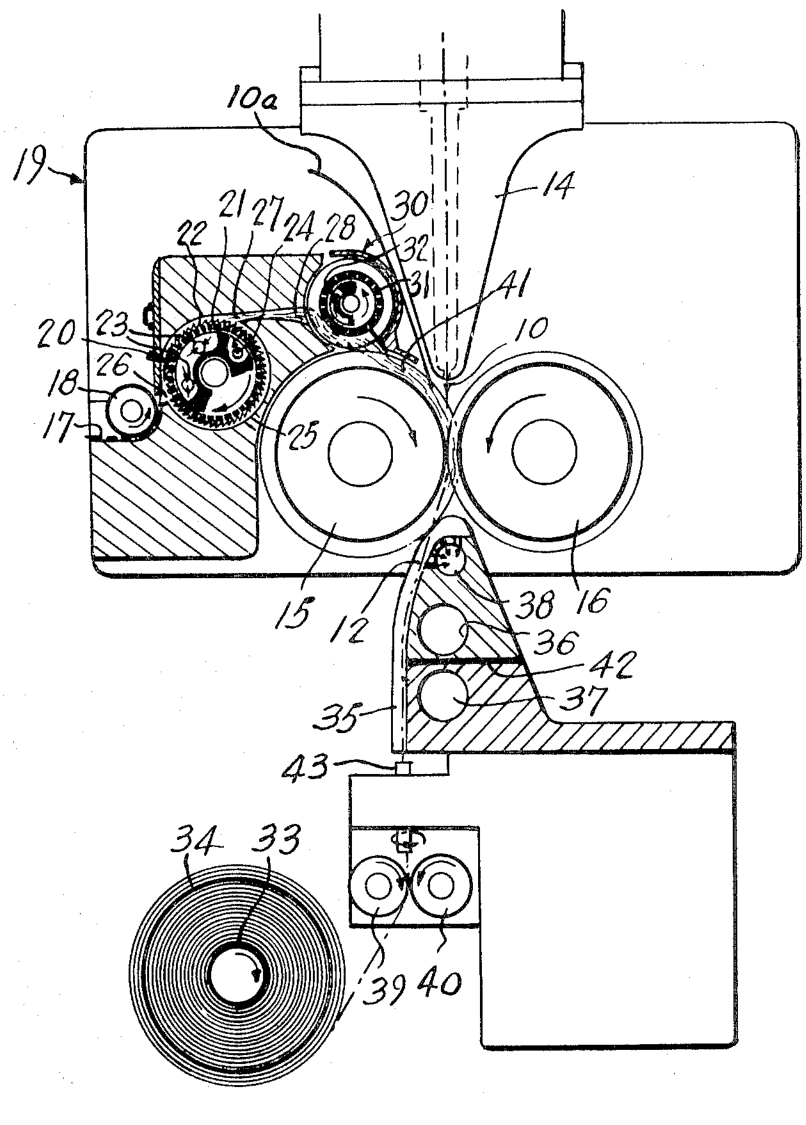

FIG. 8

3,621,646

COMPOSITE FIBRID YARNS AND METHOD OF MANUFACTURE

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U.S. Cl. 57—140 BY 13 Claims

ABSTRACT OF THE DISCLOSURE

Novel composite yarn is produced which comprises a continuous polymer substrate constituent combined with fibrids which are embedded within the polymer substrate and consolidated therewith; these fibrids generally protrude outwardly from the polymer substrate constituent in the form of filamentous units having an average length of from 1/8 to 1/2 inch and a fineness of between 0.2 and 1 denier as well as a characteristic specific surface above 2 $m.^2/g.$; they impart to the composite yarn a fibrous surface texture; this novel yarn is produced by a process generally involving extrusion of the polymer substrate and combination as well as consolidation of the extruded substrate with the fibrid units through pressure and cooling.

BACKGROUND OF THE INVENTION

(1) Field of the invention

This invention relates to a novel composite yarn comprising a continuous polymer substrate constituent into which fibrids are embedded and with which they are combined and consolidated, this resulting in a yarn of high strength and absorbency as well as an excellent fibrillated surface texture; the invention also provides a method of manufacturing such yarn in a continuous sequence of operations.

(2) Description of prior art

Ever since the introduction of fibrids, speculation has been going on in the scientific world and in the textile community on how they can best be utilized. Fibrids are a remarkable set of materials with well known properties of extremely high strength, extremely high specific surface and fineness. Defining fibrids, they are a synthetic system which occupies the position between a fiber and a film and consists of a continuous strand of interconnected segments of fine fibers and thin films forming an irregular three dimensional network of plexifilamentous and ribbon shaped components which, in fact, represent a new state of matter in the world of colloids. Since such systems are hybrids between fibers and films, they are called fibrids. This generic term does not refer to any specific material but rather characterizes a state of aggregation which possesses a very large surface area per unit weight, namely above 2 $m.^2/g.$ and up to 50 or even 60 $m.^2/g.$ In this sense and from this point of view, fibrids are filamentous and ribbon-like colloids in dry state.

The water binding capacity of fibrids, which is more than 2 g. of water per g. of fibrid, as well as their adhesivity and softening characteristics can be varied over a very wide range since it has been possible by adequate methods to prepare fibrid systems from virtually all synthetic polymers ranging from rigid, high melting polyamides and polyesters to soft and rubbery polyurethanes and polyethers.

The basic properties of fibrids, their preparation techniques and their uses are described by P. W. Morgan in his U.S. Patent No. 2,999,788 of Sept. 12, 1961.

It is well known that fibrids can be produced by a variety of methods including use of interfacial polymerization combined with shredding, polymer precipitation under shear conditions, and flash spinning. The fine fibrid elements result in entities of between about 0.2 and 1.0 denier and ribbon shaped parts between about 0.1 and 0.5 mil, all from about 1/8 to 1/2 inch long on the average. Also in the drawn condition they may exhibit fiber strengths of up to 23 grams per denier.

The fineness and the extraordinary strength as well as high absorbency and low cost of production, due to direct conversion of polymers into a highly fibrous fibrid mass (hitherto unachievable in the complex and costly polymer to staple fiber conversion processes), make fibrid ideal contenders for use in textile applications.

Unfortunately, because of fibrids' intertwined, interconnected structure of short and irregularly shaped units within an intertangled mass formed at the extrusion stage, fibrids are unsuitable for processing into yarns by conventional fiber-to-yarn conversion technologies and equipment involving the usual carding, drawing, drafting and eventually twisting operations. The main application they have found is in sheet form where they have been calendered from mat forms into bonded sheets resembling paper in appearance but exhibiting a very high strength and tear resistance with excellent absorption properties.

P. W. Morgan, in his U.S. Patent No. 2,999,788 mentions some other applications such as in cigarette filters, thermal insulation and even as surface modifiers for continuous filament yarns; however, in this latter case the yarn is simply passed through a fibrid slurry and then allowed to dry. This latter method results in higher bulk carpet yarns wherein the fibrids do not form part of the yarn itself but simply adhere to the surface of the original filament yarn, modifying said surfaces but not affecting the inherent properties of the basic yarn itself.

Other attempts have been made to produce fibrillated yarns as evidenced, for example, by U.S. Patents No. 3,081,519, issued on Mar. 19, 1963 to Herbert Blades et al.; No. 3,242,035 issued on Mar. 22, 1966 to J. R. White; No. 3,290,207 issued on Dec. 6, 1966 to E. E. Magat et al.; No. 3,379,808 issued on Apr. 23, 1968 to E. K. McIntosh et al., etc., however, they all end up with some specialty yarns for some specific purposes, produced by rather complicated and expensive techniques, which do not really solve the basic problem of providing a way for direct utilization of fibrids with their excellent properties as a component of the resulting yarn itself and to do it in a simple, efficient and very economical manner as has now been accomplished by the present applicants.

In applicants' U.S. Patent No. 3,347,727 of Oct. 17, 1967 there is already described a method according to which a plurality of continuous parallel filaments of a polymer substrate can be extruded towards the nip of a pair of rotating pressure rolls where said filaments, while still in soft and tacky condition are contacted on at least one side, with a fibrous material and the obtained combination is compressed with cooling thereby forming a plurality of ribbons of predetermined width which can be transformed into spun yarns by a twisting operation.

Furthermore, in applicants' copending U.S. patent application Ser. No. 729,089 of May 14, 1968, there is described and claimed a method for the continuous production of composite staple fiber-polymer tapes which, if they are made narrow enough, will constitute composite strands or zero twist yarns. This method generally comprises the introduction of staple fibers and tacky polymer substrate between a pair of rotating pressure rolls having continuous circumferential grooves and positioned face to face so that each male member of the grooved surface of one roll fits into the corresponding female member of the other roll to form at the nip point of said rolls cavities adjustable in depth and having edges adapted to separate the resulting composite staple fiber polymer substrate material into a plurality of fiber tapes of desired width, with simultaneous consolidation of these fibertapes within the cavities. The tacky polymer substrate is preferably extruded from an extrusion die in the form of a plurality of parallel strands, each strand entering one groove of the pressure rolls.

In another applicants' co-pending U.S. application Ser. No. 778,714 of Nov. 26, 1968 there is described and claimed a totally novel method for linear production of spun yarn at great speeds, using the composite tapes mentioned above as starting material. This method generally comprises: linearly supplying to feed-in rolls a continuous strand or tape of substantially consolidated composite fibrous material consisting of staple fibers and thermoplastic polymer substrate; heating said strand or tape within a fiber restrictive zone to a point where the polymer substrate of said composite material becomes plastic without reaching the melting point of said polymer; subjecting said strand or tape within said fiber restrictive zone to a twisting torque for imparting thereto, while the polymer substrate is in plastic condition, a predetermined twist with helical rearrangement of fibers; cooling to coagulate the polymer while the strand or tape is in twisted condition; and linearly winding up the obtained consolidated spun yarn on a collecting roll; the feed-in rolls and the collecting roll constituting two fixed pinch points between which the twist is applied and substantially retained. The fiber restrictive zone preferably consists of a heater which has a V-grooved form gradually narrowing towards the exit end of said heater, whereby the composite strands or tapes passing therethrough are simultaneously compressed for better restrictive effect and interbonding.

All these processes are, however, concerned with the use of staple fibers and none suggests the possibility of employing fibrids which, as mentioned above, are basically different from staple fibers.

SUMMARY OF THE INVENTION

It has now surprisingly been found that it is possible to process fibrids in a similar manner and to combine them with the extruded polymer, leading to either zero twist yarn or, after a subsequent twisting operation, to spun yarn which is totally new in nature and possesses very interesting and advantageous properties.

It is therefore the principal object of the present invention to provide a novel fibrid-polymer composite yarn having improved strength and water absorbency as well as a surface area of the fibrillated surface texture above 2 m.^{2}/g. In addition, the fibrous texture of the novel yarn is composed of fibrid particles having a water binding capacity enabling retention of at least 2.0 grams of water per gram of fibrid particles under a compression load of about 39 grams per square centimeter.

Another object of the invention is to provide a novel method for producing said yarn in simple, efficient and economical manner, by means of a continuous sequence of operations. Other objects and advantages of the instant invention will be apparent from the following more detailed description.

Thus, according to the invention there is first of all provided a novel composite yarn of high absorbency, high retention of absorbed liquid, outstanding durability, excellent tensile strength, superior stretch and recovery characteristics, easy performance in washing and dry cleaning, good heat sealability, excellent surface softness as well as fibrous touch and, with selected fibrids, a good chemical resistance and dielectric strength. This novel yarn comprises a continuous polymer substrate constituent within which are embedded fibrids and with which they are combined and consolidated, said fibrids generally protruding outwardly from said polymer substrate in the form of small filamentous units having on the average a length

of from ⅛ to ½ inch and a fineness of between about 0.2 and 1.0 denier as well as a fiber strength which in the drawn condition may reach values of up to 23 grams per denier. These fibrids, in combination with said polymer substrate, provide a composite yarn having the above mentioned excellent properties and characteristics as well as the desired fibrous surface texture. In addition, the continuous polymer substrate constituent may have a predetermined molecular orientation, and if spun yarn is desired, it may be twisted to a required degree.

The polymer substrate forming the continuous constituent of the novel yarn may consist of extrudable thermoplastic polymers (e.g. nylon, polypropylene, acrylonitrile, polyethylene, polyesters, polyvinylidene chloride, rubber compounds etc.) or of extrudable thermosetting polymers (e.g. phenol formaldehyde resins, urea formaldehyde resins and the like) or of their suitable blends. The fibrids may consist of hard fibrids which are generally white, fluffy, fibrous systems with high melting points (above 180° C. and up to 300° C.), complete insensitivity to the attack of water or organic solvents, large specific surface areas of up to 50 m.^{2}/g. and a considerably water binding capacity of more than 10 g. of water per g. of fibrid, which is partly due to adsorption of H_2O at polar sites on the surface of the fibrids and partly due to capillary condensation. Examples of hard fibrids are those made from 66 nylon, 610 nylon, polyesters, polyurethanes, polyureids, polyacrylonitrile, copolymers of acrylonitrile with minor quantities of vinyl acetate methacrylate, methylmethacrylate, vinylpyrrolidene and the like, copolyamides of 6, 66 and 610 nylon, copolyesters containing terephthalic acid and isophthalic or p-hydroxylbenzoic acid as components, derivatives of the polymers, such as the halogenated polyhydrocarbons, cellulosics, etc. More specifically, such hard polymers include, for example, acrylonitrile polymers and copolymers such as those formed by acrylonitrile with methylacrylate or vinyl chloride; polyacrylic and polymethylacrylic esters such as poly methylmethacrylate, polyvinyl chloride and copolymers of vinyl chloride with vinyl esters, acrylonitrile, vinylidene chloride and the like; vinylidene chloride polymers; polymers and copolymers from hydrocarbon monomers such as styrene, ethylene, propylene and the like, especially copolymers of those monomers with acrylonitrile and/or vinyl chloride; polymers from cyclic acetals, polychlorotrifluroethylene; polyvinyl alcohol; partially hydrolized polyvinyl esters; polyamides such as polyhexamethylene adipamide, polyethylene sebacamide, polymethylene bis (p-cyclohexylene) adipamide, polycaprolactam, and copolyamides, such as those formed from mixture of hexamethylenediamine, adipic acid and sebacic acid; polyesters such as polyethylene terephthalate polythioesters; polysulfonamides, polysulfones, such as the ones prepared from propylene and sulfur dioxide; polyoxymethylene, etc.

Soft fibrids are also suitable to be used according to this invention depending on the desired properties of the final yarn. These are generally white, fluffy, low melting and eventually organic soluble systems which have specific surface areas and water binding capacities similar to those of the hard fibrids and form webs which excell through their elongation, elasticity and recovery power even from considerable strains. Soft fibrids are preferably made by the precipitation method and can be obtained from a wide variety of soft and elastomeric polymers such as those represented by block copolymers of polyester or polyether segments which are linked together by aromatic diisocynate stretches; plasticized polyvinylchloride or polymethylmethacrylate and copolymers of butadiene with acrylonitrile or styrene are also suitable. Especially representative soft polymers are plasticized vinyl polymers and the condensation elastomers, including copolymers with vinylacetate and vinyldene chloride, suitable synthetic rubbers, modified addition polymers such as chlorosulfonated polyethylene, a variety of low modulus condensation elastomers and segmented condensation elastomers, etc. Various combinations or blends of hard and soft fibrids can also be used according to the present invention depending upon the required properties of the final yarn product. Also, if desired, combinations of fibrids and conventional staple fibers may be employed to produce some special effects.

Secondly, according to the present invention, there is provided a novel process for manufacturing the above mentioned composite yarns in a continuous sequence of operations. Generally this process comprises extruding at least one soft strand of an extrudable polymer substrate from an extrusion head towards the nip of a pair of lamination and consolidation rolls, continuously supplying on at least one side of said pair of lamination and consolidation rolls an intertangled mass of fibrids into a shredding, licker-in means where they are separated and fibrillated into individual substantially parallelized fibrid entities having the form of filamentous units with an average length of from ⅛ to ½ inch, forwarding said fibrid units into the nip of the lamination and consolidation rolls where they are brought into contact with the soft strand of the polymer substrate; and laminating and consolidating these fibrid units with said strand of polymer substrate to form the desired composite fibrid-polymer yarn.

The extruded soft strand of polymer substrate may also be stretched to effect molecular orientation thereof, e.g. by driving the lamination and consolidation rolls at a higher speed than the extrusion rate of the polymer substrate. Also, on the side or in between the extruded strands of polymer substrate it is possible to introduce additional already prepared and strongly oriented filaments of a same or different polymer substrate, which filaments during the lamination and consolidating operation will amalgamate with the just extruded and still tacky strands and form a unitary blend of substantially improved longitudinal strength; the prepared and oriented filaments in this blend provide the improved strength while the just extruded substrate provides the tackiness required for the consolidation of the fibrids with the polymer. Furthermore, the pressure rolls may be cooled to accelerate the consolidation effect. If twisted yarn is desired, then a predetermined twist may be imparted to the strands leaving the consolidation and lamination rolls. It should also be mentioned that these lamination and consolidation rolls may be grooved as already mentioned above and as described in applicants' copending U.S. application Ser. No. 729,089 and if the extruded polymer substrate is made of a thermoplastic material, the twisting operation is preferably carried out as disclosed in applicants' copending U.S. application Ser. No. 778,714 which has also been summarized hereinbefore.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be further described with reference to the appended drawings in which:

FIG. 1 is a side view of a zero twist yarn according to the present invention;

FIG. 2 is a section view through line A—A of one embodiment of said yarn;

FIG. 3 is a section view through line A—A of another embodiment of said yarn;

FIG. 4 is a side view of a twisted yarn according to the present invention;

FIG. 5 is a section view through line B—B of one embodiment of said yarn;

FIG. 6 is a section view through line B—B of another embodiment of said yarn;

FIG. 7 is a photomicrograph of a yarn produced according to the present invention; and

FIG. 8 is a schematic, partially sectional, side-elevation view of one non-limitative embodiment of an installation for carrying out the process according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Thus, the novel composite yarn **12** will consist of a continuous polymer substrate constitutent **10** which may be straight (FIG. 1) or twisted (FIG. 4) and which may have fibrids **11** embedded on one side thereof (FIGS. 2 and 5) or on both sides (FIGS. 3 and 6). These fibrids **11** are in the form of filamentous units each of which may contain many individual fibrids.

In the case of non-twisted structures (FIGS. 1, 2 and 3), the yarn is generally in the form of a strand of somewhat flattened cross-section having fibrids protruding from one or both sides thereof. However, these strands may also be preformed into yarns of generally round cross-section.

In the case of twisted yarn (FIGS. 4, 5, 6), it is generally of round cross-section and the fibrids may project outwardly or both outwardly and inwardly of its helicoidal polymer constituent. The individual filamentous units of the fibrids are here not only embedded into the polymeric constituent but they are also strongly retained between the twists of the yarn and this increases both their hold with the polymer constituent and the overall strength of the obtained composite yarn. When the fibrids project both within and without the helical polymer constituent (FIG. 6) this results in a bulky yarn having excellent softness. An installation for carrying out the production of such novel fibrid-polymer yarn is illustrated in FIG. 8. A curtain of soft strands **10** which will constitute the continuous polymer constituent of the resulting yarn is extruded from the extruder head **14** and toward the nip of a pair of lamination and consolidation rolls **15, 16**. Simultaneously, an intertangled mat **17** of fibrids is supplied into a shredding, licker-in means **20** through feeding roller **18**. According to a preferred embodiment, the shredding, licker-in means comprise a rotatable cylinder **21** with sharp teeth **22** protruding on its surface, which teeth may have predetermined size, shape and outward orientation depending on the desired nature of the final fibrid units. The cylinder **21** is preferably hollow and perforated on its surface and inside the cylinder there are provided suction producing means **23** and air-blowing means **24** within separate compartments. The cylinder **21** is mounted within a suitable casing **25** having an inlet aperture **26** and an outlet aperture **27**. When the mat **17** of intertangled fibrids is conveyed by the feeding roller **18** into the inlet aperture **26**, it is sucked therethrough by suction means **23** and gripped by the toothed surface of the roller **21**, thereby being disintegrated by the teeth **22** into individual filamentous units which are then conveyed from inlet **26** to outlet **27** on the surface of roller **21**. At this point the air blowing means **24** act to blow the disintegrated individual fibrid units into tunnel **28** leading toward a fibrid parallelizing and forwarding device **30**. This latter device also preferably consists of a perforated cylinder **31** having a plurality of circumferential parallel grooves into which the disintegrated individual fibrid units are pulled by suction means **32** mounted within the cylinder **31** and in which grooves they are subtantially parallelized by sequential fibrid element deposition and organization under the influence of the suction force field created by said suction means **32**.

Then, the so parallelized fibrid units are projected, generally in the form of continuous loosely held fibrid ribbons **41**, toward the nip of the lamination and consolidation rolls **15, 16** where they contact the still tacky and soft strands **10** of polymeric material. It should be noted that the suction means **32** are comprised within the drum **31** in a chamber defining about half the internal space of said drum, however, as soon as the fibrid units reach a point where the suction no longer exists, they become loose from the drum and are projected by the rotating motion of the drum **31** towards the nip of the rolls **15, 16** which generally rotate at a surface speed higher than that of drum **31**, thus aiding in transportation of said fibrid ribbons **41** from drum **31** to rolls **15, 16**, and at the same time providing some additional parallelization of the individual fibrid units within said ribbon structures **41**. While being parallelized and while travelling toward the nip of said rolls **15, 16**, these fibrid units somewhat amalgamate with one another and generally assume a form of loosely held tapes or ribbons **41** of substantially parallelized fibrids, which tapes or ribbons **41** are then contacted with the still soft and tacky polymer substrate at the nip of rolls **15, 16** and are subsequently combined and consolidated therewith by the action of said rolls. It should also be noted that additional ready filaments **10***a* having strong molecular orientation and/or any other desired characteristics can equally be introduced in-between strands **10** and forwarded towards the nip of said rolls **15, 16**.

The obtained composite yarn **12** can simply be linearly wound on a collecting roll **33** to form a package **34** of zero twist yarn. On the other hand, upon exit from the rolls **15, 16** the yarn **12** can be twisted or spun in any desired manner to form twisted yarn, which is then wound into package **34** on the collecting roll **33**.

One preferred embodiment of twisting the yarn, in which the polymer **10** is made of thermoplastic material, is also illustrated in FIG. 8. According to this embodiment, zero twist yarn **12**, after leaving the rolls **15, 16**, passes within a restricted longitudinal groove **35** provided with heating and cooling means **36** and **37**, separated by an insulating layer **42**, capable of producing proper temperature control in said groove. Suction device **38** arranges the protruding fibrous elements in a controlled direction while the yarn is being twisted and rotated in said groove **35** providing by frictonal force induced controlled laying and wrapping of said fibrous elements around the yarn **12** while it is being formed. In addition, waste removal is also being provided at this point by suction means **38**. In this groove the temperature is so controlled as to render the thermoplastic polymer somewhat plastic without however reaching the melting point of that polymer. In such plastic condition of the polymer, twisting torque is imparted to the strand **12** by a twisting device **43** from which it travels upwards, whereby a predetermined twist with helical rearrangement of the fibrids is achieved. Thereafter cooling is effected to coagulate the polymer while the strand is in such twisted condition. The cooling may be effected or helped by the cooling device **37**. On the other hand it may be achieved by compressed air or simply by providing a sufficient distance between the point where twist is imparted into the yarn within the groove **35** and twisting device **43** proper. Upon twisting, the yarn is linearly wound on the collecting roll **33** to form package **34**. Rolls **39, 40** are used to pull and guide yarn **12** while it is being twisted.

This direct twisting method is similar to the one described and claimed in applicants' co-pending U.S. application Ser. No. 778,714 of Nov. 26, 1968, already mentioned above. It is preferred for thermoplastic polymers because of its simplicity and adaptability to the present overall method, however, many other twisting techniques may be employed without departing from the scope of this invention. For example, a yarn may be twisted in an apparatus such as described and claimed in applicant's Canadian Patent No. 727,938 of Feb. 15, 1966, or by any other conventional method or device.

Furthermore, as already mentioned above, if zero twist yarns or strands are desired, they may be produced as disclosed in applicants' U.S. patent application Ser. No. 729,089 of May 14, 1968, for fibertapes. Obviously when the fibertapes are narrow enough they will constitute zero twist yarn.

If it is desired to impart additional strength to the yarn, one may effect longitudinal orientation of the polymer substrate **10** by driving rolls **15, 16** at a higher speed than the rate of extrusion of the polymer substrate from the extruder head **14**. By way of example, the ratio may be

$\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{20}$ or the like, depending on the polymer, the operation conditions, the thickness of the extruded strands, the degree of orientation desired etc. Care must be taken, however, not to break the polymer strand while stretching the same. Further orientation may be imparted between rolls **15, 16** and **39, 40** by driving the latter at a greater speed than the former. Also, as already mentioned above, an improved strength may be achieved by introducing ready filaments **10***a* which have been oriented to a very high degree and allow them to blend with the just extruded strands **10**.

Furthermore, an assembly such as **19** for disintegrating and forwarding fibrids in the form of loose filamentous substantially parallelized units toward the nip of laminating and consolidating rolls **15, 16** can also be provided at the other side by said rolls, namely beside roll **16**. Thereby, the fibrids will be continuously supplied from both sides and will be contacted and laminated on both sides of the extruded strands **10**. This will produce a yarn with even better and more homogeneous fibrous surface texture.

The yarn of the present invention may be used for many purposes. To mention just a few: carpet backing, upholstery, specialized applications such as mats of different types, industrial applications such as bags, belting, ducks, etc. In finer counts it can be used for apparel, e.g. ladies overcoats, hand knitted yarns, etc.

It will be appreciated that due to the above described remarkable properties of the fibrids, the wear resistance and the water absorbency of the products made from the new yarns will be considerably improved. They will also possess the desirable soft and smooth feel and texture.

These new yarns will be particularly attractive from the economic view point because of their cheapness. Indeed, fibrid mats are very inexpensive materials and their transformation into composite yarn according to the present invention involves a continuous very rapid and efficient procedure which is not costly either. Consequently, the advantageous properties of the obtained product far outweigh the cost of its production.

It should, of course, be understood that many modifications evident to those skilled in the art can be made without departing from the spirit of the invention. For example, depending on the desired properties of the final yarn, many combinations of the fibrids and polymer substrates may be made. These combinations may involve blends of the different materials achieved at the outset, or, for example a different type of fibrid may be applied to the polymer subsrates strands at each side thereof resulting in specific properties. Also combinations of fibrids and conventional staple fibers can be used. By proper selection of the materials, yarns may be produced which can ultimately be transformed into fabrics of high absorbency, high retention of absorbed liquids, excellent heat sealability, high wet strength, good permeability to air and liquids, with simultaneous impermeability to solids, excellent filtration characteristics, good electrical insulation properties as well as chemical resistance and dielectric strength. All these features can be achieved by men of the art through the practice of this invention and by normal adjustments and selections of the operating conditions and materials.

We claim:

1. A composite yarn comprising a continuous polymer substrate constituent combined with fibrids which are embedded within said polymer substrate and consolidated therewith, said fibrids generally protruding outwardly from said polymer substrate constituent in the form of filamentous units having an average length of from $\frac{1}{8}$ to $\frac{1}{2}$ inch, a fineness of between 0.2 and 1 denier and specific surface above 2 $m.^2/g.$, and imparting to the composite yarn a fibrous surface texture.

2. A composite yarn according to claim **1**, wherein the continuous polymer substrate constituent has a predetermined molecular orientation.

3. A composite yarn according to claim 1, characterized in that said yarn is in twisted condition.

4. A composite yarn according to claim 1, wherein the polymer substrate is made of thermoplastic polymer selected from the group consisting of nylon, polyethylene, polypropylene, acrylonitrile, polyesters, polyvinylidene chloride and rubber compounds.

5. A composite yarn according to claim 1, where the polymer substrate is made of a thermosetting polymer selected from the group consisting of phenol-formaldehyde resins and urea-formaldehyde resins.

6. A composite yarn according to claim 1, wherein the fibrid units are hard fibrids selected from the group consisting of nylon 66, nylon 610, polyesters, polyurethanes, polyureids, polyacrylonitrile, copolymers of acrylonitrile with minor quantities of vinyl acetate, methacrylate, methylmethacrylate or vinylpyrrolidene, copolyamides of nylons 6, 66 and 610, copolyesters containing terephthalic acid and isophthalic or p-hydroxylbenzoic acid as components, polythioesters, polysulfonamides, polysulfones, polyoxymethylene and their copolymers.

7. A composite yarn according to claim 1, wherein the fibrid units are soft fibrids selected from the group consisting of plasticised vinyl polymers, block copolymers of polyester or polyether segments which are linked together by aromatic diisocyanate stretches, and plasticized polyvinylchloride or polymethylmethacrylate and copolymers of butadiene with acrylonitrile or styrene.

8. A composite yarn according to claim 1, wherein the fibrid units comprise a combination of hard and soft fibrids.

9. Process for producing in a continuous sequence of operations a composite yarn having a continuous polymer substrate constituent combined with fibrids which are embedded into said polymer substrate and consolidated therewith, which method comprises: extruding at least one soft strand of an extrudable polymer substrate from an extrusion head and towards a nip of a pair of lamination and consolidation rolls; continuously supplying on at least one side of said pair of lamination and consolidation rolls an intertangled mat of fibrids into a shredding, licker-in means where they are separated and fibrillated into individual substantially parallelized fibrid entities in the form of filamentous units having an average length of ⅛ to ½ inch; forwarding said fibrid units into the nip of the lamination and consolidation rolls where they are brought into contact with the soft strands of the polymer substrate; and laminating and consolidating said fibrid units with said strand of polymer substrate to form the desired composite fibrid-polymer yarn.

10. Process according to claim 9, which comprises stretching said soft strand of polymer substrate by driving said lamination and consolidation rolls at a higher speed than the extrusion rate of the polymer substrate, thus imparting to the latter a predetermined molecular orientation.

11. Process according to claim 9, which comprises introducing at the side of each said extruded soft strand of polymer substrate and towards the nip of said lamination and consolidation rolls at least one ready filament of predetermined strength and properties.

12. Process according to claim 9, which comprises cooling the rolls or the material during the lamination and consolidation step.

13. Process according to claim 9, further comprising imparting to the composite yarn a predetermined twist.

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