

[54] **SPANDEX LUBRICANT**
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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 828,717, May 28,
1969, abandoned.
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[51] Int. Cl. ...**C10m 1/52**, D06m 15/52, D06m 15/66
[58] Field of Search.....**252/8.6, 8.8; 117/138.8 D,**
117/139.5 CQ; 260/448.2 N

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[57] **ABSTRACT**

This invention relates to lubricating finishes for Span-
dex fibers, which finishes contain a mineral oil, a sil-
icone oil, and an aminoalkyl-modified polyor-
ganosiloxane to which may be added oleic acid or iso-
stearic acid and/or butyl stearate. The finishes of this
invention prevent blocking of the Spandex fibers, in-
hibit build-up of the finish on processing rolls, and
result in treated Spandex fibers having desirable “-
hand.”

27 Claims, No Drawings

SPANDEX LUBRICANT RELATED APPLICATIONS

This application is a continuation-in-part of my copending application Ser. No. 828,717 filed May 28, 1969 now abandoned.

This invention relates to an improved lubricant finish for spandex type synthetic yarns. Spandex fibers are well known commercial products. They are polyurethanes, that is, the essentially predominant linear chain of the polymer possesses reoccurring urethane groups. Spandex may be considered a manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer comprised of at least 85 percent by weight of a segmented polyurethane.

The requirements for an ideal lubricant finish for spandex are generally similar to those of other synthetic yarns in that a low uniform level of fiber to metal, fiber to ceramic and fiber to fiber friction should be provided without any harmful side effects on the yarn. Because of the tackiness of spandex yarns, a finish is required to prevent blocking, i.e., sticking of yarns to one another, and yet to provide easy removal of yarn for processing. It is desirable for the lubricant to be easily and uniformly applied to the yarns and yet be easily removed, preferably by aqueous scour prior to dyeing or other finishing operations. Most of the now available lubricants for spandex are undesirable in that they either discolor the yarn, degrade fiber properties, are unstable solutions, require emulsification for applying or cannot be easily removed for further processing. Also some lubricants require that high (10-15 percent) percentages of the lubricant be added to the fiber to give adequate processability and this large amount of lubricant increases the amount of material which may come out of the fiber and give objectionable deposits on yarn processing equipment. Although lubricants of mineral oil and silicones have been used, they are either unstable and separate into original components, discolor or are viscous and exhibit poor wetting characteristics.

Examples of available lubricants for spandex fibers are talcum powder, textile oil compositions based on mineral oil and fatty acid esters, certain waxes which can be applied from melt and combinations of waxes and oils. All of these lubricants have deficiencies insofar as the noted requirements for an ideal finish for spandex is concerned. Talcum powder is messy and hard to apply. Mineral oil when applied in large amounts allows spandex yarn to stick to itself and cause blocking. Mineral oil has the further serious disadvantage of giving a cold, wet "hand" or feel to lubricated yarn when it is present in large proportion in the lubricant or finish. Fatty acid esters when used in dominant proportion as lubricants have detrimental effects on yarn properties. Waxes are hard to apply and gum up processing equipment. Some mixed lubricants, e.g., mineral oil, waxes and silicones are unstable or must be applied from emulsion requiring the removal of water after application.

Silicones alone do not provide sufficient lubrication, that is, reduction of film to metal and fiber to ceramic friction. This is partially due to the difficulty of adhering silicones to the film. Used alone, silicones also tend to build up on the rollers used in yarn processing. I have found, however, that when certain silicones are com-

bined with mineral oil the silicone prevents blocking or sticking together of the fibers and also inhibits build up on the processing rolls while not interfering with the lubricating properties of the mineral oil. I further found that by the proper selection and combination of silicones I can achieve a lubricant or finish which is not only an excellent lubricant and non-blocking finish, but also has the desired "hand" or feel, commonly characterized as warm or dry. My particular silicones appear to mask or hide the undesirable "hand" or feel of the mineral oil while not affecting its lubricating properties.

The lubricating finish of my invention contains from 20 to 50 percent by weight of mineral oil, from 20 to 50 percent by weight of a silicone oil, preferably a dimethyl silicone, from 5 to 40 percent by weight of an aminoalkyl-modified polyorganosiloxane, from 0 to 40 percent by weight of an acid selected from the group consisting of oleic acid and iso-stearic acid and from 0 to 40 percent by weight of butyl stearate. When both the acid and the butyl stearate are omitted the composition range is 30 to 50 percent by weight mineral oil, 30 to 50 percent silicone oil and 5 to 40 percent of the aminoalkyl-modified polyorganosiloxane, to which up to 35 percent by weight of oleic acid or iso-stearic acid, or of butyl stearate may be added. The preferred composition of the basic mixture is from 35 to 45 percent by weight mineral oil, from 35 to 45 percent silicone oil and from 10 to 25 percent by weight of the aminoalkyl-modified polyorganosiloxane.

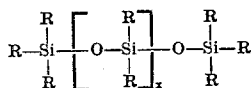
As will be seen from Example I below my basic lubricant composition of the mineral oil, silicone oil and aminoalkyl-modified polyorganosiloxane is vastly superior to known spandex lubricants such as the conventional lubricant to which it is compared. However, while my basic composition is adequate for many applications, problems can arise under some circumstances due to the reactivity of the amino groups if the amino group in the aminoalkyl-modified polyorganosiloxane is a primary amine group. This problem can be obviated by adding to my basic composition up to forty percent by weight of oleic acid or iso-stearic acid which acts to tie up the free amines in the primary amine groups of the polyorganosiloxane without, however, interfering in any way with the lubricating properties of the composition.

I have also found that for certain applications the lubricating properties of my basic composition are improved by the addition of up to 40 percent by weight of butyl stearate.

The lubricating finish of my invention should be applied in the amount of at least 3 percent by weight of the yarn. The addition of more than 6 percent by weight will not ordinarily provide any added benefit. The preferred range is from 3 through 5 weight percent of the yarn, with about 4 weight percent most preferred.

Mineral oil suitable for the invention includes any commercially available mineral oil having good lubricating properties and a viscosity between about 35 and about 50 centistokes at 25°C. A white mineral oil of about 35 centistokes viscosity is preferred.

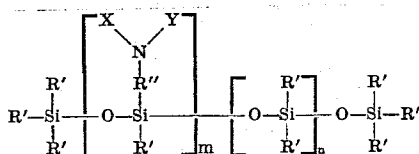
The silicone oil must be one which is soluble in mineral oil. Particular silicone oils useful in this invention include those soluble in mineral oil which are represented by the formula:



wherein each R is a monovalent hydrocarbon group and x is a number such that the silicone oil has a viscosity of from 10 through 350 centistokes at a temperature of 25°C. Illustrative of the groups represented by R in the formula are (1) the linear alkyl groups such as methyl, ethyl, propyl, butyl, amyl, octadecyl, and the like, and (2) the cycloalkyl groups such as cyclobutyl, cyclopentyl, cyclohexyl and the like, (3) the aralkyl groups such as betaphenyl ethyl, benzyl and the like, (4) the alkaryl groups such as tolyl, xylyl, ethyl phenyl and the like, (5) the aryl groups such as phenyl, naphthyl and the like, (6) the linear alkenyl groups, such as vinyl, propenyl, butenyl and the like, and (7) the cycloalkenyl groups such as cyclohexenyl and the like. All the R's in the formula need not be the same at each occurrence.

In the preferred silicone oil of my invention R in the formula above is alkyl, particularly a methyl group. Most preferably the value of x is such that the viscosity of the silicone oil is between 10 and 50 centistokes at a temperature of 25°C.

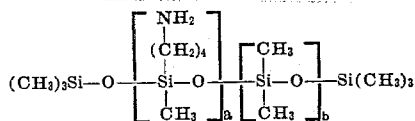
The aminoalkyl-modified polyorganosiloxanes wherein the organo groups are bonded to silicon by a carbon to a silicon bond which are useful in my invention are those having a viscosity between 800 and 1,200 centistokes at a temperature of 25°C and represented by the general formula:



wherein R and R' may be alkyl of from one through eight carbon atoms or aryl, R'' is a divalent alkylene or alkyleneoxyalkyl radical of from three through eight carbon atoms having at least three of said carbon atoms in sequence separating the silicon atom to which it is attached from the nitrogen atom to which it is attached. X and Y may be hydrogen, hydroxyethyl, phenyl, alkyl of from one through four carbon atoms or aminoalkyl having from two through four carbon atoms separating the nitrogen atoms from each other, m is a number from 5 through 100 and n is a number at least 4 times the value of m.

Preferably R' is alkyl, particularly methyl. In a preferred embodiment X and Y are both hydrogen or both methyl, or one is hydrogen and one is alkyl or aminoalkyl.

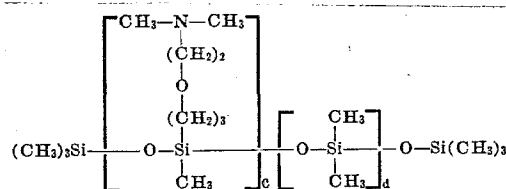
A preferred class of aminoalkyl modified polyorganosiloxanes is represented by the formula:



wherein a is a number from 4 through 50 and b has a value of from 5a through 15a. In a preferred compound

of the above formula the average value of a is 20 and of b is 180.

Another preferred class of aminoalkyl-modified polyorganosiloxanes is represented by the formula:



wherein c is a number from 4 through 50 and d has a value of from 5c through 15c. In a preferred compound the average value of c is about 20 and of d is about 180.

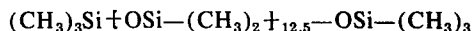
Viscosity is quite important in the lubricating finish of my invention. Too high a viscosity will result in too much lubricant on the finishing or "kiss" roll used to apply the lubricant to the yarn. This will result in a frictional drag on the yarn contacting the "kiss" roll which will unduly stretch the yarn. The viscosity in centistokes of the lubricating finish of my invention should be at least 25 and no more than about 75, with a preferred range of 30 to 45, all measured at 25°C.

The basic lubricant consisting of mineral oil, silicone oil and aminoalkyl-modified polyorganosiloxane, with or without the butyl stearate added, when mixed at room temperature will have a satisfactory viscosity. When oleic acid or iso-stearic acid is added, however, this increases the viscosity and it is desirable in such cases to heat the mixture at an elevated temperature above 100°C., preferably about 120°C. for at least one hour to reduce the viscosity to an acceptable level.

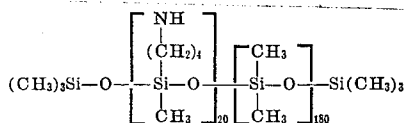
EXAMPLE I

Spandex yarn of 85 nominal denier was spun by a wet spinning process from a dimethylformamide solution which contained 25 percent by weight of a caprolactone polyester-based polyurethane-urea spandex polymer, pigmented with titanium dioxide and containing conventional stabilizer additives for protection from the degradative effects of ultraviolet light and oxidation. Without lubricant added, this yarn would not run through fiber handling machinery, could not be knitted and blocked badly. Lubricated with a conventional lubricant, hereinafter called "Lubricant C," consisting of 84 percent by weight "Marcol 52" white mineral oil, 11 percent by weight oleic acid and 5 percent by weight mixed isopropanol amines, the yarn had satisfactory friction characteristics, but blocked badly and could not be knitted. "Marcol 52" is made by the Humble Oil and Refining Company of Baltimore, Maryland, and is a National Formulary grade of white mineral oil with a viscosity in Saybolt seconds of 51 at 100°F. and 33.7 at 210°F.

A sample of this same yarn was then lubricated with 3.9 weight percent of a finish according to my invention having a viscosity of 32 centipoises at 25°C. and consisting by weight of 42.5 percent mineral oil, 42.5 percent dimethyl silicone oil and 15 percent of an aminoalkyl-modified polysiloxane. The mineral oil was "Bayol 35", made by the Humble Oil and Refining Company of Baltimore which is a technical grade of white mineral oil with a viscosity of 34 Saybolt seconds at 100°F. The silicone oil was a dimethyl silicone of the formula:



The aminoalkyl-modified polyorganosiloxane was of the formula:



The yarn thus treated according to the invention knitted well from both inside and outside the package, under 5 grams and under 10 grams tension, all after 30 days' ageing. This yarn exhibited low blocking even after 30 days' ageing.

The friction properties of the sample of yarn lubricated with the conventional Lubricant C were compared to those of the sample lubricated with the finish of my invention by measuring the force required to pull lubricated yarn over other yarn or over steel or ceramic. This is a dynamic measurement on running yarn measured on a MANRA strainometer, measured in grams per denier. The average force required to pull yarn over yarn was 0.075 grams per denier for yarn lubricated with Lubricant C but only 0.029 for yarn lubricated with my finish. To pull yarn on steel it required 0.098 grams per denier for Lubricant C lubricated yarn and 0.071 for yarn lubricated according to my invention, while for yarn over ceramic the figures were 0.070 grams per denier and 0.057 respectively. Yarn lubricated according to the invention had an original whiteness measured or the reflectance of light at 550 millimicrons of 85 as compared to 83 for the yarn lubricated with Lubricant C and a change in fade index per hour of 0.47 as compared to 0.34 for the Lubricant C lubricated yarn.

EXAMPLE II

Spandex yarn of 80 nominal denier was spun by a wet spinning process from a dimethylformamide solution which contained 28 percent by weight of a caprolactone-based polyurethane-urea spandex polymer, pigmented with titanium dioxide and containing conventional stabilizer additives for protection from the degradative effects of ultraviolet light and oxidation. Without lubricant added, this yarn would not run through fiber handling machinery, could not be knitted and blocked badly. Lubricated with 3.6 weight percent of a conventional lubricant, hereinafter called "Lubricant C", consisting of 84 percent by weight "Marcol 52" white mineral oil, 11 percent by weight oleic acid and 5 percent by weight mixed isopropanol amines, the yarn had satisfactory friction characteristics, but blocked badly and could not be knitted under 10 grams tension after 5 days ageing. "Marcol 52" is made by the Humble Oil and Refining Company of Baltimore, Maryland, and is a National Formulary grade of white mineral oil with a viscosity in Saybolt seconds of 51 at 100°F and 33.7 at 210°F.

A sample of this yarn was then lubricated with 4.0 weight percent of a finish according to my invention having a viscosity of 50 centipoises at a temperature of 25°C. and consisting by weight of 30 percent Bayol 35 (as characterized in Example I), 30 percent of a silicone oil, 15 percent of an aminoalkyl-modified polysiloxane, 10 percent oleic acid and 15 percent

butyl stearate. The silicone oil and polysiloxane were the compounds described in Example I. The components were mixed together at room temperature and then heated at a temperature of 120°C for a period of 1 hour. The yarn thus treated according to the invention knitted well from both inside and outside the package, under 5 grams and 10 grams tension, all after 5 days' ageing.

The friction properties of the sample of yarn lubricated with the conventional Lubricant C were compared to those of the sample lubricated with the finish of this example according to my invention by measuring the force required to pull lubricated yarn over other yarn or over steel or ceramic. This is a dynamic measurement on running yarn measured on a MANRA strainometer, measured in grams per denier. The average force required to pull yarn over yarn was 0.122 grams per denier for yarn lubricated with Lubricant C but only 0.043 for yarn lubricated with my finish. To pull yarn on ceramic it required 0.187 grams per denier for Lubricant C lubricated yarn and 0.056 for yarn lubricated according to my invention. Yarn lubricated with Lubricant C broke when pulled over steel and when pulled over nylon while yarn coated with my lubricant required a pull of 0.234 grams per denier over steel and 0.239 over nylon. Yarn lubricated according to the invention had an original whiteness measured as the reflectance of light at 550 millimicrons of 88.4 as compared to 88.3 for the yarn lubricated with Lubricant C.

EXAMPLE III

Spandex of the same type used in Example II and having the same properties was lubricated with 3.5 weight percent of a finish according to my invention having a viscosity of 50 centipoises at a temperature of 25°C. and consisting by weight of 37.5 percent Bayol 35 (as characterized in Example I), 37.5 percent of silicone oil, 15 percent of an aminoalkyl-modified polyorganosiloxane and 10 percent of oleic acid. The silicone oil and polyorganosiloxane were the compounds described in Example I. The components were mixed together at room temperature and then heated at a temperature of 120°C. for a period of 1 hour. The yarn thus treated according to the invention knitted well from both inside and outside the package, under 5 and 10 grams tension, all after 5 days ageing.

The friction properties of the sample of yarn lubricated with the conventional Lubricant C were compared to those of the sample lubricated with the finish of my invention by measuring the force required to pull lubricated yarn over other yarn or over steel or ceramic. This is a dynamic measurement on running yarn measured on a MANRA strainometer, measured in grams per denier. The average force required to pull yarn over yarn was 0.122 grams per denier for yarn lubricated with Lubricant C but only 0.044 for yarn lubricated with my finish. To pull yarn on ceramic it required 0.187 grams per denier for Lubricant C lubricated yarn and 0.060 for yarn lubricated according to my invention. Yarn lubricated with Lubricant C broke when pulled over steel and when pulled over nylon while yarn coated with my lubricant required a pull of 0.270 grams per denier over steel and 0.271 over nylon. Yarn lubricated according to the invention

had an original whiteness measured as the reflectance of light at 550 millimicrons of 88.7 as compared to 88.3 for the yarn lubricated with Lubricant C.

EXAMPLE IV

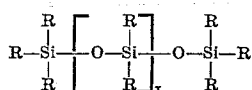
Spandex of the same type used in Example II and having the same properties was lubricated with 4.0 weight percent of a finish according to my invention having a viscosity of 50 centipoises at a temperature of 25°C. and consisting by weight of 35 percent Bayol 35 (as characterized in Example I), 35 percent of silicone oil, 15 percent of an aminoalkyl-modified polyorganosiloxane and 15 percent of butyl stearate. The silicone oil and polyorganosiloxane were the compounds described in Example I. The yarn thus treated according to the invention knitted well from both inside and outside the package, under 5 and 10 grams tension, all after 5 days ageing.

The friction properties of the sample of yarn lubricated with the conventional Lubricant C were compared to those of the sample lubricated with the finish of my invention by measuring the force required to pull lubricated yarn over other yarn or over steel or ceramic. This is a dynamic measurement on running yarn measured on a MANRA strainometer, measured in grams per denier. The average force required to pull yarn over yarn was 0.122 grams per denier for yarn lubricated with Lubricant C but only 0.044 for yarn lubricated with my finish. To pull yarn on ceramic it required 0.187 grams per denier for Lubricant C lubricated yarn and 0.054 for yarn lubricated according to my invention. Yarns lubricated with Lubricant C broke when pulled over steel and when pulled over nylon while yarn coated with my lubricant required a pull of 0.135 grams per denier over steel and 0.130 over nylon. Yarn lubricated according to the invention had an original whiteness measured as the reflectance of light at 550 millimicrons of 89.0 as compared to 88.3 for the yarn lubricated with Lubricant C.

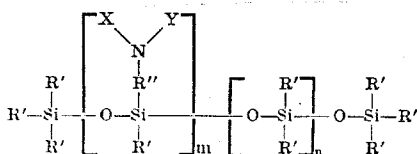
What is claimed is:

1. A lubricating finish for spandex fibers consisting essentially of

from 20 to 50 percent by weight of mineral oil,
from 20 to 50 percent by weight of a mineral oil-soluble silicone oil of the formula:



wherein R may be the same or different monovalent hydrocarbon groups and x is a number such that the silicone oil has a viscosity of from 10 through 350 centistokes at a temperature of 25°C.,
from 5 to 40 percent by weight of an aminoalkyl-modified polyorganosiloxane of the general formula:



wherein R' may be the same or different alkyl group of from one through eight carbon atoms or aryl and R'' is a divalent alkylene or alkyleneoxyalkyl group of from three through eight carbon atoms having at least three of said carbon atoms in sequence separating the silicon atom to which it is attached from the nitrogen atom to which it is attached, X and Y may each be hydrogen, hydroxyethyl, phenyl, alkyl of from one through four carbon atoms, or an amino-alkyl having from two through four carbon atoms separating the nitrogen atoms from each other, m is a number from 5 through 100 and n is a number at least 4 times the value of m.

from 0 to 40 percent by weight of at least one acid selected from the group consisting of oleic acid and iso-stearic acid, and

from 0 to 40 percent by weight of butyl stearate.

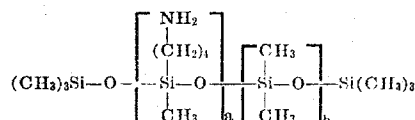
2. A lubricating finish according to claim 1 wherein the silicone oil is of the average formula:



wherein x is a number such that the silicone oil has a viscosity of from 10 through 50 centistokes at a temperature of 25°C.

3. A lubricating finish according to claim 2 wherein x has an average value of 12.5.

4. A lubricating finish according to claim 1 wherein the aminoalkyl-modified polyorganosiloxane is of the general formula:



wherein a is a number from 4 through 50 and b has a value of from 5a through 15a.

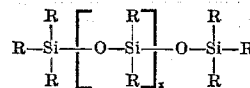
5. A lubricating finish according to claim 4 wherein the average value of a is about 20 and of b is about 180.

6. A lubricating finish according to claim 1 having a viscosity at 25°C. of from 25 through 75 centistokes.

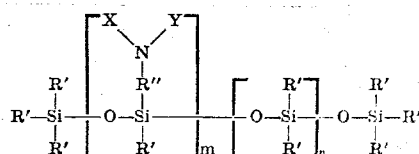
7. A lubricating finish according to claim 1 having a viscosity at 25°C. of from 35 through 50 centistokes.

8. A lubricating finish for spandex fibers consisting essentially of from 30 to 50 percent by weight of mineral oil

from 30 to 50 percent by weight of a mineral oil-soluble silicone oil of the formula:

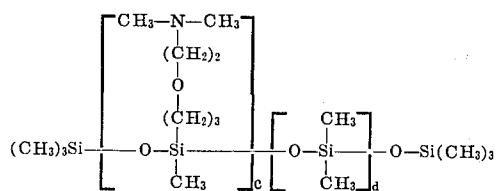


wherein R may be the same or different monovalent hydrocarbon groups and x is a number such that the silicone oil has a viscosity of from 10 through 350 centistokes at a temperature of 25°C., and
from 5 to 40 percent by weight of an aminoalkyl-modified polyorganosiloxane of the general formula:



wherein R' may be the same or different alkyl group of from one through eight carbon atoms or aryl and R'' is a divalent alkylene or alkyleneoxyalkyl group of from three through eight carbon atoms having at least three of said carbon atoms in sequence separating the silicon atom to which it is attached from the nitrogen atom to which it is attached, X and Y may each be hydrogen, hydroxyethyl, phenyl, alkyl of from one through four carbon atoms, or an aminoalkyl having from two through four carbon atoms separating the nitrogen atoms from each other, *m* is a number from 5 through 100 and *n* is a number at least 4 times the value of *m*.

9. A lubricating finish according to claim 8 wherein the aminoalkyl-modified polyorganosiloxane is of the general formula:



wherein *c* is a number from 4 through 50 and *d* has a value of from 5*c* through 15*c*.

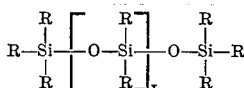
10. A lubricating finish according to claim 9 wherein the average value of *c* is about 20 and of *d* is about 180.

11. A lubricating finish according to claim 9 which additionally contains up to 35 percent by weight of at least one acid selected from the group consisting of oleic acid and iso-stearic acid.

12. A lubricating finish according to claim 9 which additionally contains up to 35 percent by weight of oleic acid.

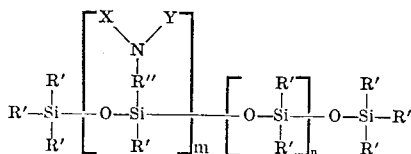
13. A lubricating finish according to claim 9 which additionally contains up to 35 percent by weight of butyl stearate.

14. Spandex fiber coated with at least 3 weight percent of a lubricating finish consisting essentially of from 20 to 50 percent by weight of mineral oil, from 20 to 50 percent by weight of a mineral oil-soluble silicone oil of the formula:



wherein R may be the same or different monovalent hydrocarbon groups and *x* is a number such that the silicone oil has a viscosity of from 10 through 350 centistokes at a temperature of 25°C.,

from 5 to 40 percent by weight of an aminoalkyl-modified polyorganosiloxane of the general formula:



wherein R' may be the same or different alkyl group of from one through eight carbon atoms or aryl and R'' is a divalent alkylene or alkylene-oxyalkyl group of from three through eight carbon atoms having at least three of said carbon atoms in sequence separating the silicon atom to which it is attached from the nitrogen atom to which it is attached, X and Y may each be hydrogen, hydroxyethyl, phenyl, alkyl of from one through four carbon atoms, or an aminoalkyl having from two through four carbon atoms separating the nitrogen atoms from each other, *m* is a number from 5 through 100 and *n* is a number at least 4 times the value of *m*,

from 0 to 40 percent by weight of at least one acid selected from the group consisting of oleic acid and iso-stearic acid, and

from 0 to 40 percent by weight of butyl stearate.

15. Spandex fiber coated according to claim 14 with a finish having a viscosity at 25°C. of from 25 through 75 centistokes.

16. Spandex fiber coated according to claim 14 with a finish having a viscosity at 25°C. of from 35 through 50 centistokes.

17. Spandex fiber coated according to claim 14 with from 3 through 5 weight percent of said lubricating finish.

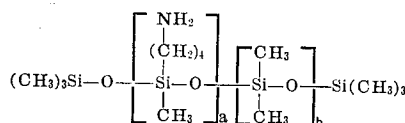
18. Spandex fiber coated according to claim 14 with a finish wherein the silicone oil is of the average formula:



wherein *x* is a number such that the silicone oil has a viscosity of from 10 through 50 centistokes at a temperature of 25°C.

19. Spandex fiber coated according to claim 18 with a finish wherein *x* has an average value of 12.5.

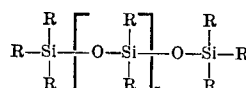
20. Spandex fiber coated according to claim 14 with a finish wherein the aminoalkyl-modified polyorganosiloxane is of the general formula:



wherein *a* is a number from 4 through 50 and *b* has a value of from 5*a* through 15*a*.

21. Spandex fiber coated according to claim 20 with a finish wherein the average value of *a* is about 20 and of *b* is about 180.

22. Spandex fiber coated with at least 3 weight percent of a lubricating finish consisting essentially of: from 30 to 50 percent by weight of mineral oil, from 30 to 50 percent by weight of a mineral oil-soluble silicone oil of the formula:

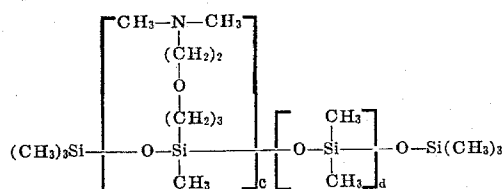


wherein R may be the same or different monovalent hydrocarbon groups and *x* is a number such that the silicone oil has a viscosity of from 10 through 350 centistokes at a temperature of 25°C., and

$$\begin{array}{c} \text{X} \quad \text{Y} \\ \diagdown \quad \diagup \\ \text{N} \\ \diagup \quad \diagdown \\ \text{R}'' \\ | \\ \text{R}'\text{-Si-O-Si-} \cdots \text{O-Si-O-Si-R} \\ | \quad | \quad | \quad | \\ \text{R}' \quad \text{R}' \quad \text{R}' \quad \text{R}' \end{array}$$

23. Spandex fiber coated according to claim 22 with finish wherein the aminoalkyl-modified polyor-

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27. Spandex fiber coated according to claim 23 with a finish which additionally contains up to 35 percent by weight of butyl stearate.

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