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W. MENDEL

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ARTIFICIAL FILAMENT AND METHOD FOR ITS PRODUCTION

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Fig. 1.

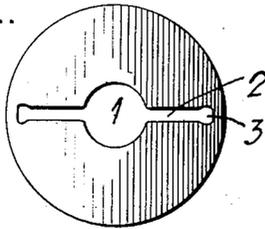


Fig. 2

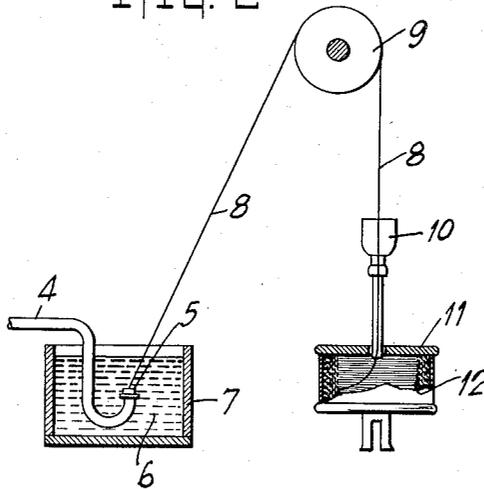
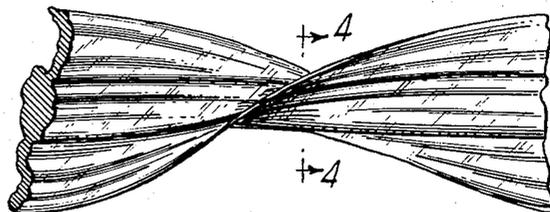


Fig. 4.



Fig. 3.



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ARTIFICIAL FILAMENT AND METHOD FOR ITS PRODUCTION

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10 Claims. (Cl. 18—8)

This invention relates in general to artificial filaments adapted to be woven, braided or otherwise utilized in fabrics and millinery, and to a process and a spinneret for forming the same from viscose solutions and the like. More particularly it relates to an artificial horse-hair filament commonly known as "visca", and includes correlated improvements and discoveries whereby the production and properties of artificial filaments are enhanced.

According to the Dictionary of Tariff Information 1924, visca is known in the trade as sineline, visca lame and artificial silk bands. In appearance it closely resembles ribbon straw of artificial silk—a name applied to it—being lustrous and flexible and having a surface slightly striated and crinkled. It is manufactured in sizes varying from a thread $\frac{1}{2}$ mm. wide to ribbon-like bands 21 mm. wide.

Visca is used substantially the same way as straw, either alone or in combination with chip or hemp, for making hat braids. It is also employed with warp or filling of cotton, artificial silk or metal thread, in the weaving of millinery all-overs.

In the art to which this invention appertains, it has long been desired to have a visca strand of covering ability per unit of weight equal to or greater than that afforded by rough natural straw. It was also the desire that the artificial filament should show the principal surface and ornamental characteristics of rough straw, that is, the surface should have a rough, scintillating appearance in reflected light. The artificial strands of the prior art have smooth unbroken surfaces of high gloss, and are lacking in covering power and ornamental effect.

It is an object of the invention to provide an improved "visca" filament or strand, of surface characteristics such that the reflection of light therefrom will produce a scintillating optical and decorative effect in imitation of that produced by rough natural straw.

Another object of the invention is to provide a visca filament having a relatively large solid body section and thin crinkled fin sections extending from the body section longitudinally of the filament.

It is a further object of the invention to provide a spinneret having an orifice of such shape as to impart to plastic bodies extruded therethrough the cross-sectional characteristics of the improved filament.

An additional object of the invention is to provide a filament produced from a viscose solution which is characterized by having a shriveled relatively large body section, thin crinkled fin sections joined to said body and radially disposed upon the surface and extending longitudinally of the body and having helical twists and multitudinous

facets adapted to reflect light with a scintillating effect.

Still another object of the invention is to provide a process for the production of artificial filaments having a unique appearance and of greater covering power than natural straw and which can be readily, economically and efficiently produced on a commercial scale.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

In the practice of the invention a visca filament such, for example, as an artificial horse-hair filament may be formed of any suitable viscous solution or plastic mass; for example a cellulose solution such as viscose (sodium cellulose xanthate) or a solution of a cellulose ester, cellulose ether, cellulose oxyether and other cellulose derivatives in a suitable solvent.

An artificial straw or visca filament of improved properties is obtained by extruding a suitable viscous solution or plastic mass through a spinneret having a body portion provided with an orifice characterized by a relatively large central section and relatively thin slot-shaped orifices extending radially therefrom, coagulating the extruded strand under tension and, after purification, drying the strand free of tension, whereby an uneven shrinkage occurs in the thick body section relative to the thin fins. Further, by coordinating the speed of spinning with the amount of stretch given the raw strand as well as the process of drying, the uneven shrinkage of the several parts can be widely augmented. When thus prepared, the finished visca filament has a helical twist of a few times per meter and the thin fins, owing to their crinkled and convoluted form, impart to the surface a rough, scintillating optical effect in reflected light similar to, but more decorative than that shown by the more expensive natural straws utilized in this art.

The invention accordingly comprises an article of manufacture possessing the features, properties and relation of elements, and an improved spinneret having the features of construction, combination of elements and arrangement of parts, and a process comprising the several steps and the relation of one or more of such steps with respect to each of the others, all as exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be made to the following detailed description taken in conjunction with the accompanying drawing, in which:

Fig. 1 represents a top plan view, greatly enlarged, of one modification of the novel spinneret of this invention.

Fig. 2 is a diagrammatic view in elevation,

partly in section, illustrating certain steps of my improved process.

Fig. 3 represents a fanciful view, greatly enlarged, of a novel visca filament which may result from the use of the spinneret shown in Fig. 1.

Fig. 4 represents a sectional view, of the strand of Fig. 3 taken along the line 4—4 thereof.

In Fig. 1 there is shown an illustrative modification of a novel spinneret comprising a body portion which is provided with a relatively large centrally disposed orifice 1. This is shown as substantially circular, and it may have, for example, a diameter of about 0.021 inch. The slot-shaped orifices 2, extending radially and connecting with the orifice, are each preferably of a length equal to or greater than the diameter of the central orifice. These slot-shaped orifices may be, for example, about 0.030 inch in length and about 0.005 inch in mean width. The outermost ends of the slot-shaped orifices preferably are enlarged or flared outward slightly and the corners 3 thereof rounded to enable the viscous solution to flow past the end walls of the slot-shaped orifices at approximately the same rate as from the central orifice.

It will be observed that the novel spinneret may be designed with an orifice having, in general, the characteristic cross-sectional form desired in the finished filament. If a filament of great roughness is desired, the number of fins may be increased to three, four or more by employing a spinneret having an orifice giving an enlarged body section, and three, four, or more slot-shaped orifices extending radially therefrom. A filament having a single fin may be prepared by use of a spinneret having a relatively large orifice and a single fin, but such filaments show a pronounced tendency to curl, which for certain purposes may lessen their utility. It is therefore preferred to employ a spinneret having two or more slot-shaped orifices disposed about the central orifice. These slot-shaped orifices may be symmetrically or asymmetrically disposed with respect to the orifice.

A suitable apparatus for preparing filaments by use of the improved spinneret is shown diagrammatically in Fig. 2, in which a viscose or the like solution supplied through a conduit 4, is extruded through an improved spinneret 5 into a suitable hardening bath 6 contained in a vessel 7. The hardened strands 8 are stretched as spun by being carried over a rotating pulley or godet 9 from which they may descend through a funnel 10 into a rotating centrifugal spinning box 11 wherein the strands are twisted and simultaneously coiled against the sides to form a so called "cake" 12. The spinning box 11 is preferably of the "bucket" type.

If the peripheral speed of the pulley 9 drawing off the filament is 50 meters per minute (spinning speed), and the speed of the rotating box is 100 meters per minute, the twist produced in the filament should be

$$\frac{100}{50} = 2$$

turns per meter of filament spun. The number of twists per unit of length may be varied as desired, but the filament has a greater resemblance to natural rough straw when the number of twists is not more than five per meter.

The cake 12 of raw visca may be subjected to the usual processes of purification and finishing. For example, when the filament is prepared from a viscose solution the cake 12 may be treated in

succession to the action of a dilute acid or acid salt solution, a desulphurizing agent, a bleaching agent, and then washed and glycerinated. During drying the filament preferably is maintained substantially free of tension. The unequal shrinkage of the thick body section relative to the fins results in the fins becoming crinkled and convoluted, and further there is a slight increase in the number of twists per unit of length of the strand, when drying is thus carried out.

It will be realized that without transcending the scope of the invention, the visca filament may be dyed, or rendered opaque by the use of suitable dyes and pigments, and may be waterproofed, fireproofed and otherwise treated or decorated.

It will be seen that the invention accordingly comprises an improved spinneret of novel design and an article of manufacture produced by the use of the same, as an artificial horse-hair or visca filament characterized by a shriveled cylindrical body section having crinkled fin sections joined to said body and radially disposed upon the surface longitudinally of the body section. The crinkled, convoluted fins and the shriveled body section afford multitudinous facets adapted to reflect light with a scintillating effect highly desired in the art. This improved filament has a covering power per unit of weight greater than that of prior artificial horse-hair or visca of cylindrical cross-section and has an ornamental effect equal to or greater than that of the higher priced rough natural straws. The availability of this novel artificial horse-hair in continuous lengths permits a wide variety of weaving, knitting and braiding operations to be performed by machinery instead of by hand as necessitated by the use of natural straw.

Since certain changes may be made in the above article, the improved spinneret and the process for producing the same, and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense except as specified in the appended claims.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

The expression "visca" as used in the claims is intended to cover an artificial filament as defined in the "Dictionary of Tariff Information", U. S. Tariff Commission, Washington, D. C. 1924.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. As an article of manufacture, an artificial filament comprising a thick shriveled body section and a thin crinkled fin section joined to said body.
2. As an article of manufacture, an artificial filament comprising a thick shriveled body section, thin crinkled fin sections joined to said body, said fins being radially disposed and extending longitudinally of said filament, and multitudinous facets adapted to reflect light with a scintillating effect.

3. As an article of manufacture, an artificial filament comprising a thick shriveled body section, thin crinkled fin sections joined to said body, said filament being further characterized by helical twists and multitudinous facets adapted to reflect light with a scintillating effect.

4. As an article of manufacture, an artificial filament comprising a thick shriveled body section, a plurality of thin crinkled fin sections symmetrically disposed about and joined to said body section and extending longitudinally of said filament, and multitudinous facets adapted to reflect light with a scintillating effect.

5. As an article of manufacture, an artificial filament comprising a thick, shriveled body section, thin crinkled fin sections joined to said body and having lengths not less than the diameter of said body section, said fins being radially disposed and extending longitudinally of said filament and multitudinous facets adapted to reflect light with a scintillating effect.

6. As an article of manufacture, a visca filament resembling natural straw and comprising a thick, shriveled body section and a thin, crinkled fin section joined to said body, said filament having a twist of not more than five turns per meter and having multitudinous facets adapted to reflect light with a scintillating effect.

7. An improved spinneret for artificial filaments comprising a body portion provided with a relatively large central orifice and relatively narrow slot-shaped orifices extending radially from

said central orifice, said slot-shaped orifices having lengths at least equal to the diameter of the central orifice.

8. An improved spinneret for artificial filaments comprising a body portion provided with a substantially circular, relatively large central orifice and relatively narrow slot-shaped orifices extending radially from and symmetrically disposed about said central orifice, said slot-shaped orifices having lengths at least equal to the diameter of the central orifice.

9. An improved spinneret for artificial filaments comprising a body portion provided with a substantially circular central orifice and a plurality of relatively narrow slot-shaped orifices extending radially from and symmetrically disposed about said central orifice, the ends of said slot-shaped orifices being enlarged and rounded.

10. An improved spinneret for artificial filaments comprising a body portion having a relatively large central orifice having a diameter of about .021 of an inch and a relatively narrow slot-shaped orifice extending radially from said central orifice and having a length of about .030 of an inch.

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