April 12, 1960 HANS-JOACHIM DIETZSCH ET AL 2,932,079

COMPLEX ARTIFICIAL FILAMENTS

Filed March 8, 1956

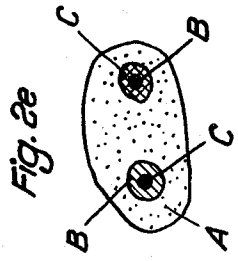

Fig. 2e

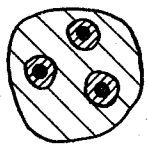

Fig. 2d

Fig. 2c

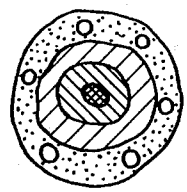

Fig. 4

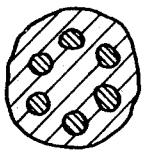

Fig. 1b

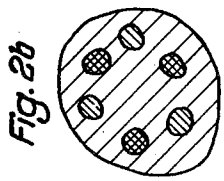

Fig. 2b

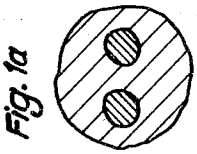

Fig. 1a

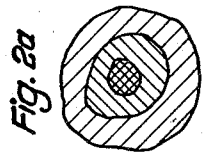

Fig. 2a

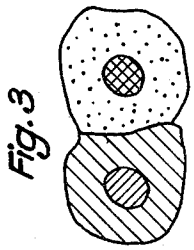

Fig. 3

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United States Patent Office

2,932,079

Patented Apr. 12, 1960

2,932,079

COMPLEX ARTIFICIAL FILAMENTS

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Application March 8, 1956, Serial No. 570,250

3 Claims. (Cl. 28—82)

This invention deals with the improvement of complex artificial filaments comprising two or more longitudinal sections of different spinning materials. Such filaments may comprise a hollow gas-filled core or may consist of compound structures of two or more different spinning materials joined in centrally symmetrical or non-symmetrical distribution. Such artificial filaments of inhomogeneous material cross-section are known.

These known complex artificial filaments comprise only two different materials across the cross-section one of which may be of gaseous nature to form a hollow, hose-like structure.

It is also known to produce crimped filaments by extruding into a setting medium at least two differing liquid spinning materials capable of imparting different shrinkage to equally stretched filaments thereof in a way to form a plurality of unitary filaments each having at filaments made of two differing spinning materials, entire length of the filament by intermingled portions of the materials with partial free peripheries of the components.

There are also known artificial filaments of composite character comprising at least two basic components one of which is disposed between two portions of the other or others which may cover the lateral surfaces of the former component completely or only partially.

It is a primary subject of this invention to provide complex artificial filaments comprising at least two cores of differing spinning materials embedded in a sheath body made of a further differing spinning material.

Further features and advantages of this invention will be apparent from the drawing and the description thereof hereinafter.

The drawings illustrate on a large scale cross-sections of filaments shaped according to this invention.

Figures 1*a* and 1*b* show configurations of complex filaments made of two differing spinning materials,

Figures 2*a* to 2*e* show configurations of complex filaments made of three differing spinning materials,

Figure 3 shows a complex filament made of four differing spinning materials,

Figure 4 shows a complex filament made of concentric zones of four differing spinning materials and comprising a plurality of hollow cores in the outer zone.

The filament shown in Figure 1*a* comprises two and the filament shown in Figure 1*b* comprises six cores made of a spinning material B, e.g. viscose embedded in a base made of a differing spinning material A, e.g. linear polymeric resin. The cores may also be filled by air or a foamy substance to improve the heat insulating properties.

The filament structures shown in the Figures 2*a* to 2*e* comprise three differing spinning materials. Figure 2*a* shows a filament comprising in concentric arrangement a central core of one material surrounded by an inner ring-shaped sheath of a second material this ring again being surrounded by an outer sheath of a third material.

Figure 2*d* shows a similar arrangement the outer sheath surrounding three duplex cores. Figure 2*b* shows a filament comprising each three cores of two differing spinning materials embedded in radial distribution in a base made of a third spinning material. Figure 2*c* shows a ribbon-like filament, the outer body whereof having a cross-section in the shape of a dumbbell. The two other spinning materials form cores arranged in the side-portions of the ribbon. Figure 2*e* shows an arrangement similar to that of Figure 2*d* comprising an outer body of one spinning material A surrounding two duplex cores made of the other two spinning materials B and C. In one of the duplex cores the material B forms the outer ring and the material C the central core, and in the other duplex core the material C forms the outer ring and the material B the central core.

The complex filament shown in Figure 3 consists of four differing spinning materials distributed on two core filaments joined side-by-side.

The complex filament shown in Figure 4 consists of four coaxial zones each made of a differing spinning material. In the outer sheath are embedded six secondary cores filled by air or a foamy mass to create a special optical effect.

The novel complex filaments are produced by spinnerets provided with multi-stage nozzles. Such spinnerets are the subject matter of a copending application Serial No. 570,401, filed March 8, 1956. The main feature of these spinnerets consists in the provision of multi-stage nozzle bodies built into and sealed in the partitions of the feed chamber, the nozzle tubes of said spinning bodies telescoping into one another and ending at one end practically in a common discharge plane, i.e. the plane of the nozzle end and at the other end in respective feed chambers whereby said nozzle tubes are integrally joined at least at one intermediate zone.

The term "spinning material" used in the description of this invention comprises all materials adapted to be formed in dissolved or molten states. Therefore, the term "spinning" denotes only a short word for the all embracing principle of the plastic working or deforming of materials under pressure or tension, e.g. besides "spinning" in the narrow technical sense, it comprises also the processes of the extrusion, pressing, or drawing, of injection molding or pressure casting etc.

This invention primarily has to do with materials of organic composition like cellulose, cellulose compounds, aldehyde condensation products, albumin and other nitrogenous substances like casein, gelatin and especially artificial resins comprising vinyl-, acryl-, styryl- and other non-saturated groups especially modern linear polymers. According to their nature these spinning materials are shaped into form-persistent fibrous structures by loss of heat or drying out or by suitable solidifying agents like liquid precipitants, cooling gas, etc.

The novel complex filaments may comprise colouring or other ingredients to give special optical effects such as iridescence, lustre, shot-colour, etc.

The novel complex filaments may also have a crimped structure by preparing them in spinnerets provided with vibrating nozzle heads.

The novel complex filaments may be produced as single filaments. A preferred embodiment of this invention consists in complex artificial filament bundles produced in multi-orifice spinnerets. These bundles may comprise in symmetrical or other distribution single filaments of differing cross-sectional structure-inclusive monotonic ones.

What we claim is:

1. Complex artificial filament of uniform and constant cross section over its entire length comprising at least

two cores extending in spaced relation with one another and consisting of different spinning materials, and a sheath body of a further different spinning material, the said cores being embedded in the sheath.

2. Complex artficial filament of uniform and constant cross section over its entire length comprising two cores of different spinning materials, and a base of a third spinning material with the two cores embedded in spaced lateral zones respectively of the base.

3. Complex artificial filament according to claim 1, in which at least one core is an axially extending gas filled space.

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