

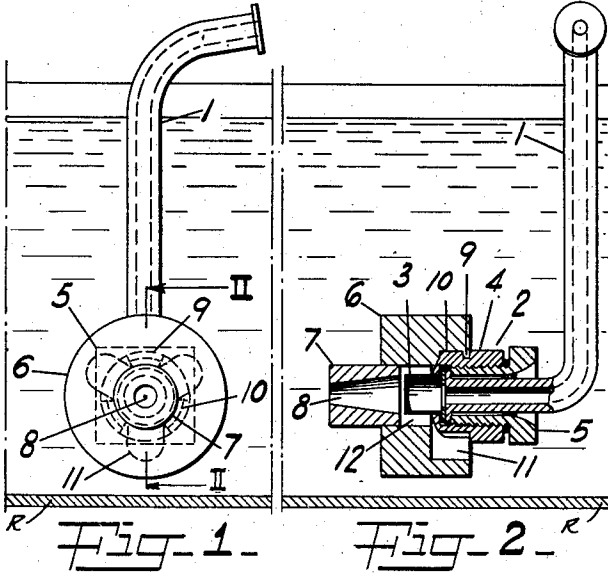
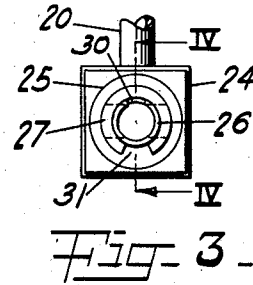
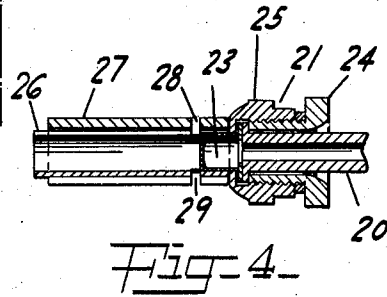
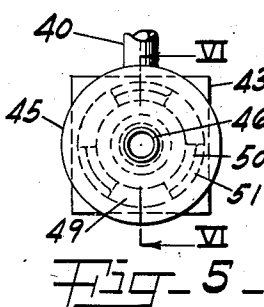
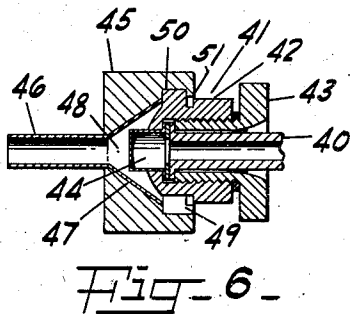
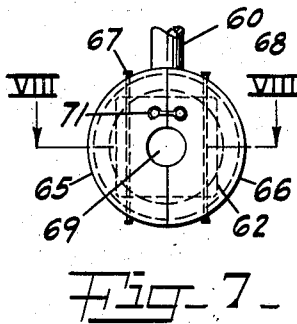
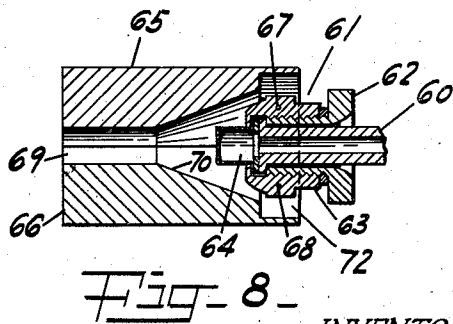
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METHODS AND APPARATUS FOR SPINNING SYNTHETIC SHAPES

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METHOD AND APPARATUS FOR SPINNING
SYNTHETIC SHAPES

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1

This invention relates to improvements in methods and apparatus for spinning synthetic shaped articles such as yarns, threads, and the like where the material to comprise the shaped article is extruded through a spinneret into a liquid bath.

In spinning synthetic shaped articles such as synthetic yarns, threads, and the like, a viscous liquid solution of the material to comprise the shaped article, such as viscose, cellulose acetate and the like, is extruded through a spinneret or jet into a liquid bath where the desired shaped article is formed. In the usual practice, a number of spinnerets are positioned in the same bath and the bath is continually circulated in order to maintain its composition uniform. In circulating the bath, currents and turbulence are created which act adversely on the freshly formed shaped article in the region adjacent the face of the spinneret and subject it to strains which affect its dyeing properties. The shaped article will dye unevenly and often with a barre effect. It is found that this action of the currents and turbulence in the bath can be eliminated by protecting the viscose cellulose acetate, and the like as it emerges from the spinning jet and is changing from a liquid to a solid. This can be accomplished by providing the spinneret with an adjunctage or sleeve which projects from the spinneret in the direction in which the shaped article is spun. An adjunctage or sleeve having an internal diameter of from one-half to twice the diameter of the face of the spinneret and a length of from one to four times the diameter of the face of the spinneret gives a satisfactory result. To insure the presence of spinning bath liquid in the region adjacent the face of the spinneret, means may be provided for permitting spinning bath liquid to flow into the sleeve member without creating turbulence in the region adjacent the face of the spinneret.

This invention has for its principal object to provide improvements in methods and apparatus for spinning synthetic shaped articles where the material to comprise the article is extruded into a liquid bath.

A further object of the invention is to provide improvements in apparatus for spinning synthetic shaped articles into a liquid bath, comprising means for protecting the article being spun from turbulence and currents in the bath while the article is still in a plastic or nascent state.

Other objects and advantages of the invention

2

will be apparent from the following description and accompanying drawing.

In the drawing,

Figure 1 is a front elevational view of a form of apparatus embodying the invention and disposed in normal operating position in a spinning bath, the receptacle for which is shown in section.

Figure 2 is a sectional view taken on the line II—II in Figure 1.

Figure 3 is a front elevational view of a modification of the invention.

Figure 4 is a sectional view taken on the line IV—IV in Figure 3.

Figure 5 is a front elevational view of another modification of the invention.

Figure 6 is a sectional view taken on the line VI—VI in Figure 5.

Figure 7 is a front elevational view of a further modification of the invention.

Figure 8 is a sectional view taken on the line VIII—VIII in Figure 7.

Referring to Figures 1 and 2 of the drawing, the reference character 1 indicates a rounder which is adapted to be attached at one end to a suitable metered supply of spinning solution. A spinneret 3 is attached to the other end of the rounder by the jet union indicated generally by reference character 2. The union comprises a split male part 5 and a female part 4. The means for protecting the shape being spun while it is still in a nascent or plastic state comprises the collar member 6 which is adapted to be attached to the female part of the jet union and which is formed with a central chamber 12. A sleeve member or adjunctage 7 is fitted to the collar member and is provided with a tapered central bore 8 leading to the central chamber and in line with the axis of the spinneret. The collar member is provided with passageways 11 communicating with the central chamber 12 which permit spinning bath in receptacle R to flow into the region adjacent the face of the spinneret. Inwardly extending lugs 9 are formed on the collar member which cooperate with the outwardly extending lugs 10 on the female part of the jet union to form a bayonet joint whereby the collar and the sleeve member may be readily attached to the spinneret.

Referring to the modification of the invention shown in Figures 3 and 4, reference character 20 indicates a rounder which is adapted to be attached at one end to a metered supply of spinning solution. A spinneret 23 is attached at the other end by the jet union indicated generally by the reference character 21. The jet union

3

comprises a split male part 24 and a female part 25. The means for protecting the shaped article being spun while it is still in a nascent or plastic state comprises concentric sleeve or adjutage members 26 and 27 which slip over and engage the side wall of the spinneret. The sleeve members 26 and 27 are rotatable relative to each other and are provided with longitudinally extending slots 30 and 31 respectively which may be placed in alignment to permit the sleeves to be applied to or removed from the spinneret without interrupting the spinning operation. Aligned slots or openings 28 and 29 are formed in the sleeve members adjacent the face of the spinneret which extend in a direction transverse to the axis of the sleeve members and permit the spinning bath to flow into the region adjacent the face of the spinneret.

Referring to the modification of the invention shown in Figures 5 and 6 of the drawing, reference character 40 indicates a rounder which is adapted to be attached at one end to a metered supply of spinning solution. A spinneret 44 is attached to the other end of the rounder by the jet union indicated generally by reference character 41. The jet union comprises a split male part 43 and a female part 42. The means for protecting the shaped article being spun while it is still in a nascent or plastic state comprises a protecting member having a conical shaped portion 48 and a cylindrical sleeve or adjutage 46. The protecting member is clamped to the female part of the jet union, with the cylindrical portion in line with the spinneret. The collar 45 has a conical shaped central chamber 47 which is adapted to receive and engage the conical shaped portion of the protecting member. The collar is provided with inwardly extending lugs 51 which cooperate with the outwardly extending lugs 50 on the female part of the jet union to form a bayonet joint whereby the collar and protecting member are clamped to the spinneret. Passageways 49 are formed in the collar member which permit spinning bath to flow into the region adjacent the face of the spinneret.

Referring to Figures 7 and 8 of the drawing wherein a further modification of the invention is shown, reference character 60 indicates a rounder, one end of which is adapted to be attached to a metered supply of spinning solution. A spinneret 64 is attached to the other end of the rounder by the jet union indicated generally by reference character 61. The jet union comprises a split male part 62 and a female part 63. The means for protecting the shaped article being spun while it is still in the nascent or plastic state comprises the members 65 and 66 pivotally mounted on the pins 67 and 68 which extend in parallel relation through the female part of the jet union. The members 65 and 66 are provided with a central bore 69 leading to the conical shaped chamber 70 into which the spinneret extends. One-half of the central bore is formed in each of the members with the center line lying in the plane of the meeting faces of the members when they are in operative position. A central bore 72, of relatively large diameter, is formed in the end of the members 65 and 66 adjacent the spinneret which communicates with the conical chamber 70. This permits spinning bath liquid to flow into the conical chamber in the region adjacent the face of the spinneret. The members 65 and 66 are held together when in operative position by the latch member 71. At the start of the spinning operation the members 65

4

and 66 are spread apart by pivoting on their supporting pins 67 and 68 to permit the thread or yarn that is first formed to be drawn through them. Then the members 65 and 66 are brought together and are retained by the latch member 71.

The parts of the apparatus that come in contact with the spinning bath and the spinning solution are made of material that is chemically resistant to the spinning bath and the spinning solution.

It is readily seen that this invention is applicable to the conventional forms of spinnerets that are used in forming synthetic shaped articles in a liquid spinning bath. The article is protected as it emerges from the face of the spinneret and is still in a plastic or nascent state from cross currents and turbulence in the spinning bath which would strain it and affect its physical characteristics.

It is to be understood that this invention is applicable to the spinning of all shaped articles such as yarns, threads, filaments, ribbons, and films where a solution of the material to comprise the shape, such as viscose, cuprammonium, cellulose acetate, resin solution and the like, is extruded into a liquid bath.

While preferred embodiments of the invention have been shown, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

What we claim is:

1. The method of forming artificial filaments comprising extruding a solution of the material to be formed into filaments into a liquid coagulating bath, inducing flow of a portion of the liquid in the bath adjacent the filaments along with the filaments solely by virtue of the travel of such filaments through the bath, and protecting the filaments extruded into the bath from cross currents in the bath while the filaments are still in a nascent state so that the induced flow is rendered nonturbulent and substantially stream-lined until the filaments are sufficiently solid to resist the straining action of such cross currents.

2. An apparatus for spinning artificial filaments under submerged conditions in a liquid coagulating bath comprising a rounder, a spinneret having orifices through which material to be coagulated is extruded, a jet union holding the spinneret on the rounder, a channel-defining means comprising two sections movable with respect to each other, each section being pivotally supported by the jet union, said channel-defining means being disposed about the spinneret and extending from behind the spinneret to a substantial distance in advance thereof, said means providing a channel in alignment with the spinneret, said channel having a small size such that, at all points throughout its length in advance of the spinneret face, its diameter is not substantially greater than twice the diameter of the spinneret face and tapering to an internal diameter at least as small as the diameter of the spinneret face in a transverse plane a short distance in advance of the spinneret face to provide a path of travel of reduced area for the freshly extruded material, and passageways between said means and the jet union back of the spinneret face communicating with the channel to permit the coagulating liquid to flow into the same back of the face of the spinneret.

3. An apparatus for spinning artificial filaments under submerged conditions in a liquid

coagulating bath comprising a normally stationary rounder, a spinneret having orifices through which material to be coagulated is extruded, a jet union for securing the spinneret to the rounder, stationary protective means releasably mounted on and being supported by the jet union in predetermined position relative to the spinneret, said protective means being disposed about the spinneret extending from behind the spinneret face to a substantial distance in advance thereof, said protective means providing a channel in alignment with the spinneret, said channel having a small size such that, at all points throughout its length in advance of the spinneret face, its diameter is not substantially greater than twice the diameter of the spinneret face and tapering to an internal diameter at least as small as the diameter of the spinneret face in a transverse plane a short distance in advance of the spinneret face to provide a path of travel of reduced area for the freshly extruded material, passageways between the jet union and protecting means and communicating with the channel to permit the coagulating liquid to flow into the same back of the face of the spinneret, said protective means and spinneret being entirely submerged in a spinning bath so that the coagulating liquid is free to circulate from the bath through the passageways and the protective means past the spinneret and back to the bath.

4. An apparatus for spinning artificial filaments under submerged conditions in a liquid coagulating bath comprising a rounder, a spinneret having orifices through which material to be coagulated is extruded, a jet union holding the spinneret on the rounder, a sleeve member disposed about the spinneret extending from behind the spinneret to a substantial distance in advance thereof, said sleeve member providing a channel in alignment with the spinneret, said channel having a small size such that, at all points throughout its length in advance of the spinneret face, its diameter is not substantially greater than twice the diameter of the spinneret face and tapering to an internal diameter at least as small as the diameter of the spinneret face in a transverse plane a short distance in advance of the spinneret face to provide a path of travel of reduced area for the freshly extruded material, and a collar member releasably supported on the jet union and being disposed about the sleeve member for supporting the sleeve member in predetermined position relative to the spinneret, said collar member being provided with passageways around the jet union back of the spinneret face and communicating with the channel of said sleeve member to permit the coagulating liquid to flow into the same back of the spinneret face.

5. An apparatus for spinning artificial filaments under submerged conditions in a liquid coagulating bath comprising a rounder, a spinneret having orifices through which material to be coagulated is extruded, a jet union holding the spinneret on the rounder, a collar member releasably supported on the jet union extending from behind the spinneret to a substantial distance in advance thereof and provided with a chamber adapted to receive the spinneret, a sleeve member carried by the collar member in predetermined position relative to the spinneret and hav-

ing a channel forming a continuation of said chamber in alignment with the spinneret, said channel having a small size such that, at all points throughout its length in advance of the spinneret face, its diameter is not substantially greater than twice the diameter of the spinneret face and tapering to an internal diameter at least as small as the diameter of the spinneret face in a transverse plane a short distance in advance of the spinneret face to provide a path of travel of reduced area for the freshly extruded material, said collar member being provided with passageways around the jet union back of the spinneret face and communicating with the chamber of the collar member adapted to receive the spinneret, to permit the coagulating liquid to flow into the same back of the spinneret face.

6. An apparatus for spinning artificial filaments under submerged conditions in a liquid coagulating bath comprising a rounder, a spinneret having orifices through which material to be coagulated is extruded, a jet union holding the spinneret on the rounder, a channel-defining means comprising two sections separable from each other, each section being releasably mounted on and being supported by the jet union in predetermined position relative to the spinneret, said channel-defining means being disposed about the spinneret and extending from behind the spinneret to a substantial distance in advance thereof, said means providing a channel in alignment with the spinneret, said channel having a small size such that, at all points throughout its length in advance of the spinneret face, its diameter is not substantially greater than twice the diameter of the spinneret face and tapering to an internal diameter at least as small as the diameter of the spinneret face in a transverse plane a short distance in advance of the spinneret face to provide a path of travel of reduced area for the freshly extruded material, and passageways between said means and the jet union back of the spinneret face communicating with the channel to permit the coagulating liquid to flow into the same back of the face of the spinneret.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,549,364	Kempf et al.	Aug. 11, 1925
1,371,113	Prims	Mar. 8, 1921
2,138,394	Wuppermann	Nov. 29, 1938
2,243,116	Ostermann	May 27, 1941
2,246,990	Wuppermann	June 24, 1941
2,054,852	Dreyfus	Sept. 22, 1936

FOREIGN PATENTS

Number	Country	Date
3,606	British	1907
293,977	British	July 19, 1928
394,049	British	June 22, 1933
9,946	Netherlands	Aug. 17, 1923