Oct. 22, 1968 MICHIO TSUJI 3,406,427

APPARATUS FOR SPINNING COMPOSITE FIBERS

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FIG. 1.

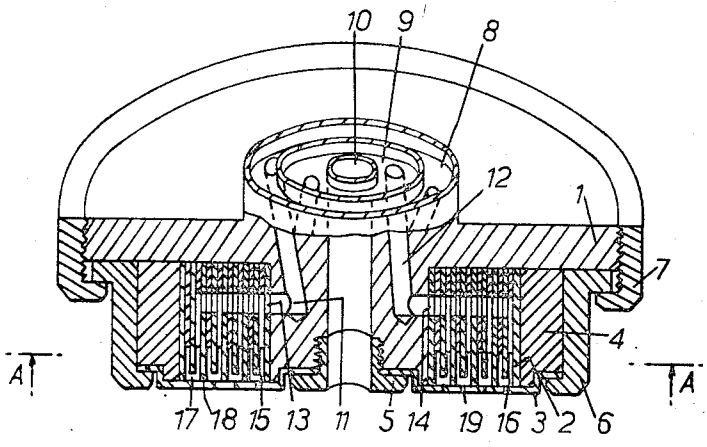

FIG. 2.

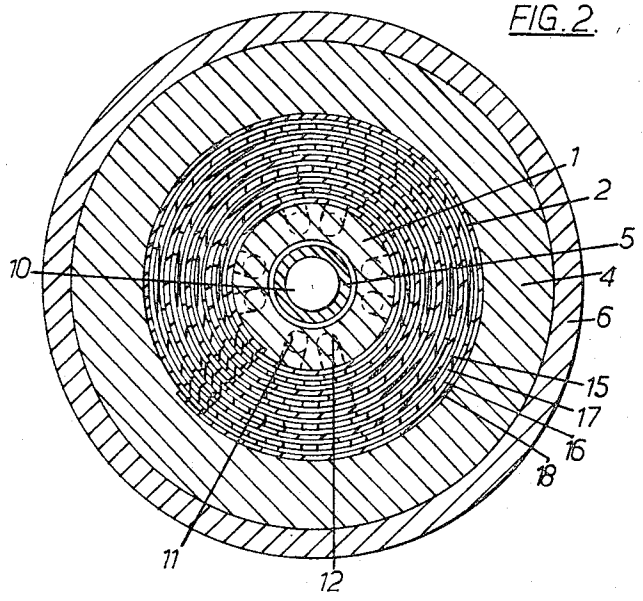

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FIG. 3.

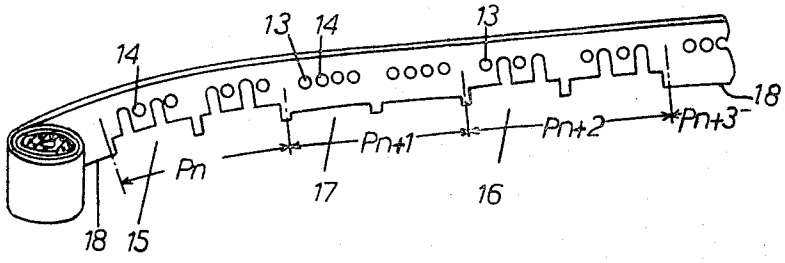
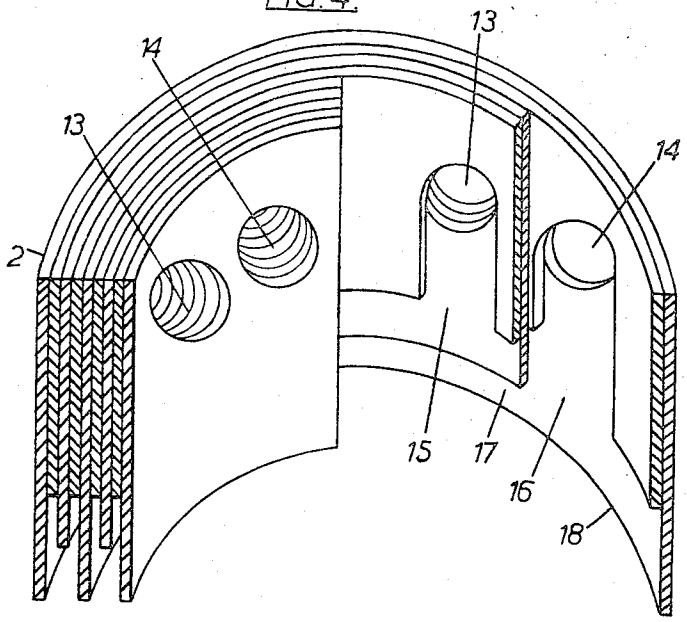


FIG. 4.



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APPARATUS FOR SPINNING COMPOSITE FIBERS

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Claims priority, application Japan, Nov. 4, 1965, 40/89,875
1 Claim. (Cl. 18—8)

ABSTRACT OF THE DISCLOSURE

An apparatus for producing a composite fiber from at least two fiber forming liquids. A raw spinning liquid supplying block, a central depending portion with a coagulating liquid bore extending therethrough and a distributing plate spirally wound therearound with a spinneret plate against the bottom edge of said spirally wound distributing plate. The distributing plate has a first and second plurality of liquid introducing holes spaced along the length thereof at distances such that when the plate is spirally wound the holes are aligned to form a first and a second bore, the bores being in communication with the respective inlets. A first and second plurality of liquid introducing notches and a plurality of liquid bonding notches lie along the bottom edge of the distributing plate with the liquid distributing notches lying adjacent each other and separated by the portion of the plate above a corresponding bonding notch and the said corresponding bonding notch joining the distributing notches to form a liquid bonding space above the spinneret plate. The spinneret plate has the orifices along the liquid bonding spaces.

The present invention relates to a spinning apparatus for use in the production of composite fibers composed of at least two kinds of fiber forming polymers.

As is already known, composite fibers formed by bonding or conjugating dissimilar polymer components along the length thereof develop spiral crimps owing to the difference between the thermal shrinkage or swelling properties of the two components. The present invention is intended to provide a novel apparatus for producing such composite fibers, wherein a raw spinning liquid supplying block is provided with a belt-like distributing plate convolutely wound therearound, and in order that individual spinning liquids may pass through separate passages in the raw spinning liquid supplying block and be bonded together in a space in the vicinity of the rear surface of a spinnerette, the distributing plate is provided with suitable holes and notches, said spinnerette being provided with nozzle holes in conformity with the position of the space in the vicinity of the rear surface of the spinnerette where the raw spinning liquids are bonded together.

With the present apparatus, it is very easy to remarkably increase the number of the holes of a spinnerette. By supplying a coagulating liquid through a central coagulating liquid-supplying opening, it is possible to make uniform the contact between the spun fibers and the coagulating liquid, and to produce fibers of uniform nature.

The apparatus of the present invention will now be described with reference to the drawings in which:

FIG. 1 is a perspective view, in longitudinal section of the apparatus according to the invention;

FIG. 2 is a section taken on the line A—A of FIG. 1;

FIG. 3 is a perspective view of a raw liquid distributing plate partially unwound; and

FIG. 4 is a perspective view, in longitudinal section and on an enlarged scale showing liquid passages in the raw liquid distributing plate.

In the drawings a raw spinning liquid supplying block

1 has a distributing plate 2 around a depending central portion thereof. A central bore 10 for coagulating solution extends through the depending central portion. An outer sleeve 4 is positioned around the distributing plate 2. An inner spinneret plate holder 5 is threaded into the bottom of the depending portion of block 1 and holds the inner edge of spinneret plate 3 against the depending portion. An outer spinneret plate holder 6 has a flange holding the outer edge of spinneret plate 3 to the bottom of outer sleeve 4 and in turn is held against the bottom of block 1 by clamping ring 7 threaded to the block 1. The spinneret plate 3 has spinning orifices 19 therein. The raw spinning liquid supplying block is provided with a plurality of flow passages 11 and a plurality of flow passages 12 communicating with respective raw liquid inlets 8 and 9 and the distributing plate 2. The band-like distributing plate 2 is in the form of a metal plate and is convolutely wound on the depending portion of the raw spinning liquid supplying block 1, and the outer sleeve 4 is fitted thereon to hold the distributing plate in position. The distributing plate is provided with liquid introducing notches 15 and 16, liquid bonding notches 17 and liquid partitions 18 spaced along the length thereof so that when the distributing plate 2 is wound around the spinning liquid supplying block 1, as shown in FIG. 1, the liquid introducing notches 15 and 16 form convolute clearances. Further, in the vicinity of the rear surface of the spinneret plate 3, the liquid introducing notches 15 and 16 are placed in communication through the liquid bonding notches 17 to form a single space, thus defining a convolute liquid bonding space. Spinning orifices in the spinneret plate 3 are positioned along said bonding spaces. This clearance is separated from adjacent liquid bonding spaces by liquid partitions 18. The distributing plate 2 has a plurality of introduction holes 13 spaced therealong so that in the wound up condition the holes 13 are aligned to form a bore leading from the flow passage 11 of the raw spinning liquid supplying block 1 to the liquid introducing notch 15 and also has another plurality of introduction holes 14 aligned when the plate is wound up to form a bore leading from the flow passage 12 to the liquid introducing notch 16. The portions of the plate between the holes 13 and the notches 15 are removed to place the holes 13 in communication with notch 15, and the portion of the plate between the holes 14 and the notches 16 are removed to place the holes 13 in communication with the notches 16. The lengths of the liquid introducing notch 15, liquid bonding notch 17, liquid introducing notch 16 and liquid partition 18 are expressed by Pn, $Pn+1$, $Pn+2$ and $Pn+3$, respectively. Thus, the distributing plate 2 is wound around the raw spinning liquid supplying block 1.

What I claim is:

1. An apparatus for producing a composite fiber from at least two fiber forming liquids, comprising a raw spinning liquid supplying block having a central depending portion with a coagulating liquid bore extending therethrough and having at least two separated raw spinning liquid inlets therein, a distributing plate spirally wound around said depending central portion, and a spinneret plate against the bottom edge of said spirally wound distributing plate, said distributing plate having a first and second plurality of liquid introducing holes spaced along the length thereof at distances such that when the plate is spirally wound the holes are aligned to form a first and a second bore, said distributing plate further having a first and second plurality of liquid introducing notches along the bottom edge thereof and a plurality of liquid bonding notches along the bottom edge thereof, said notches being spaced so that when the distributing plate is spirally wound the liquid distributing notches lie ad-

jacent each other and are separated by the portion of the plate and above a corresponding bonding notch and the said corresponding bonding notch joins the distributing notches to form a liquid bonding space above the spinneret plate, said spinneret plate having orifices along the liquid bonding spaces, said distributing plate having the portions between the holes of the first plurality of holes and the first plurality of notches removed to place the holes of said first plurality and the notches of the first plurality in communication, and said distributing plate having the portions between the holes of said second plurality of holes and the second plurality of notches removed to place the holes of the second plurality and the notches of the second plurality in communication,

said liquid supplying block having a plurality of passages from one inlet to the bore formed by said first plurality of holes and a further plurality of passages from the other inlet to the bore formed by the second pluraltiy of holes.

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