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R. M. LODGE ET AL

3,546,328

METHODS FOR THE PRODUCTION OF HETEROFILAMENTS

Original Filed July 24, 1963

4 Sheets-Sheet 1

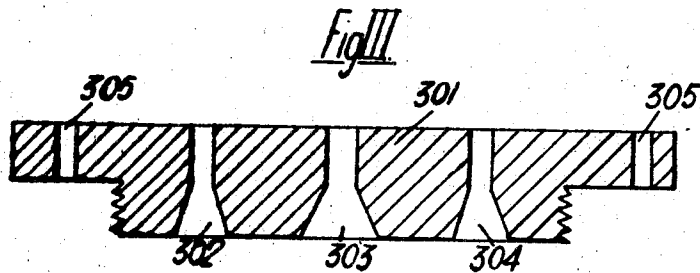
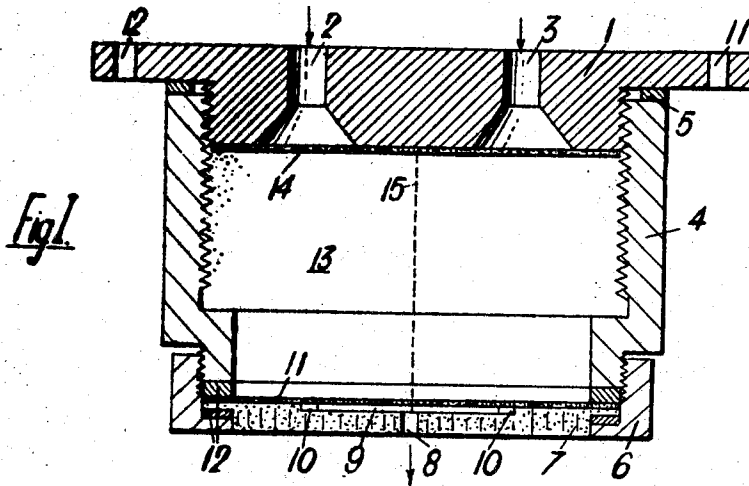
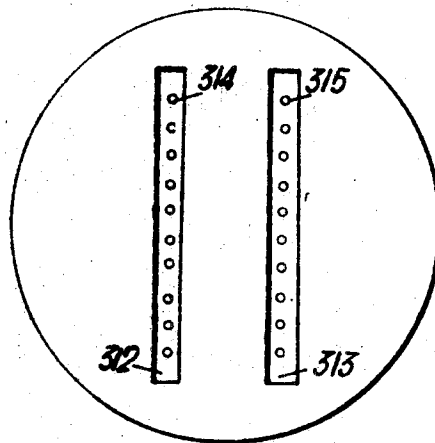


Fig III(a)



Inventors
Reginald Montague Lodge
Dwight Madoc Jones
By
Cushman, Karby & Cushman
Attorneys

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Fig. 1a

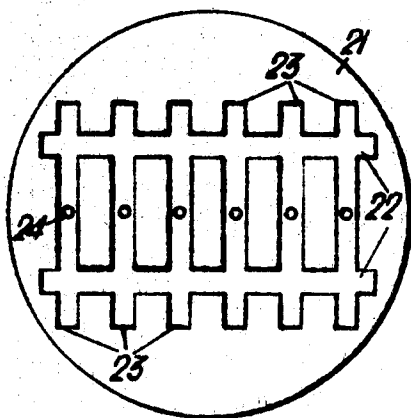


Fig. 1b

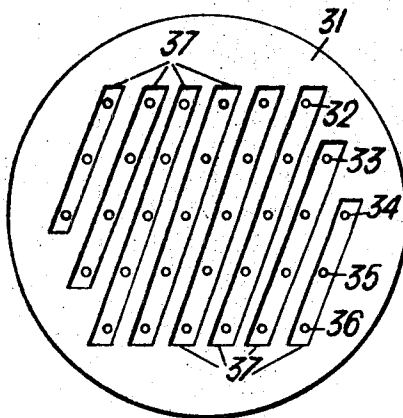


Fig. 1c

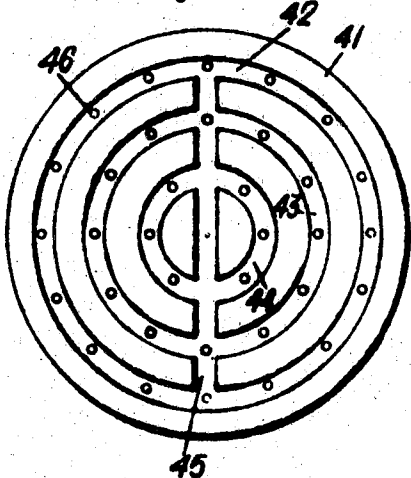


Fig. 1d

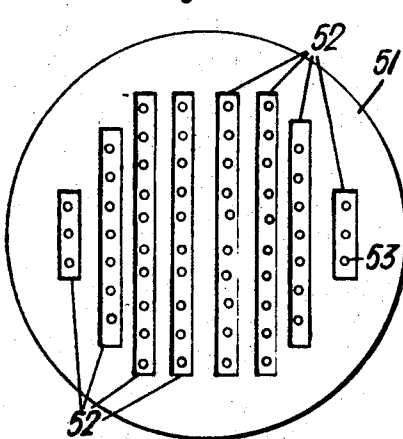
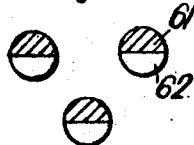


Fig. 1e



Inventors
Reginald Montague Lodge
Dewi Madoc Jones
By
Cushman, Darby & Cushman
Attorneys

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R. M. LODGE ET AL

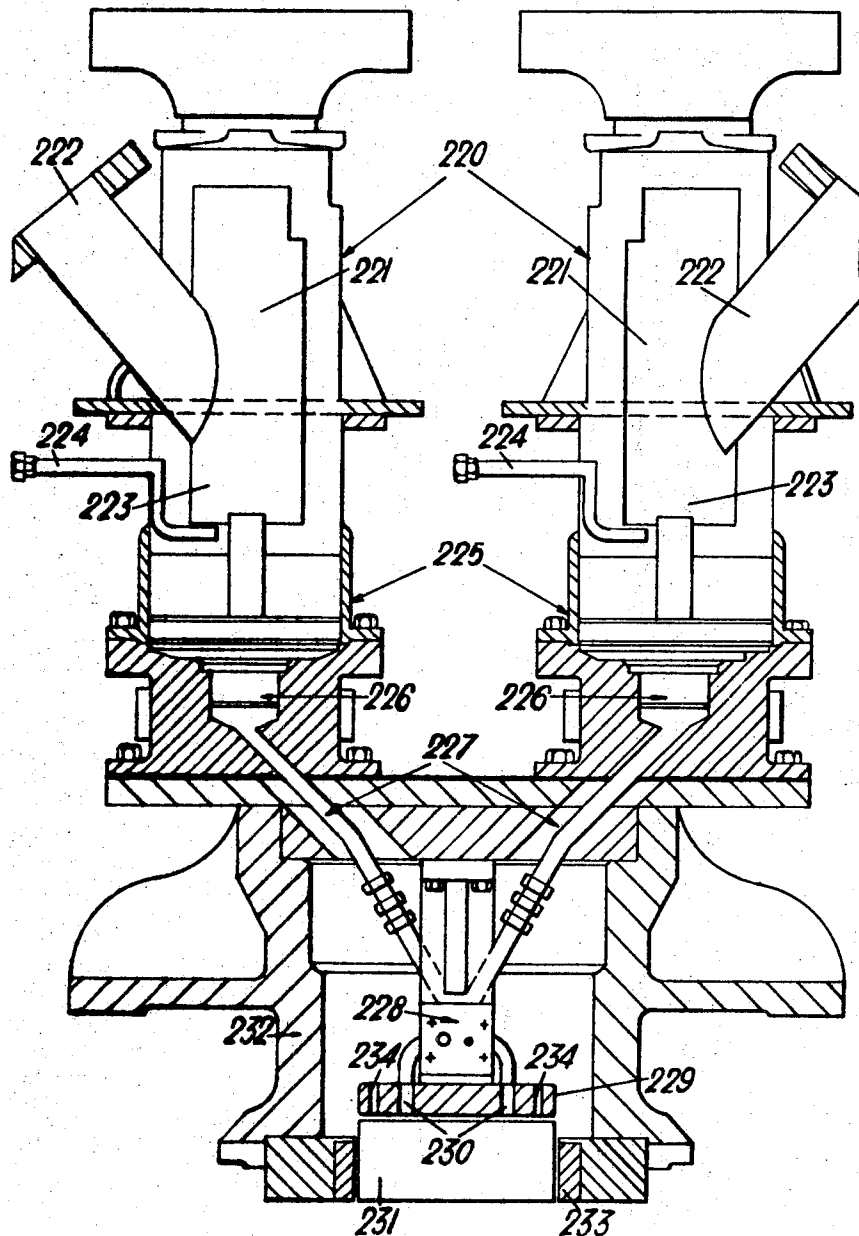
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Fig II



Inventors
Reginald Montague Lodge
Dewi Madoc Jones
By *Cushman, Darby & Cushman*
Attorneys

Dec. 8, 1970

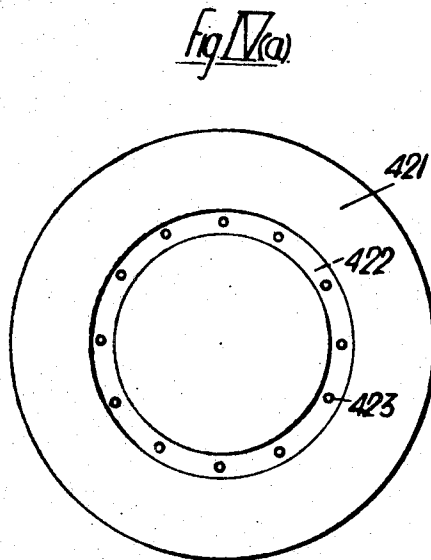
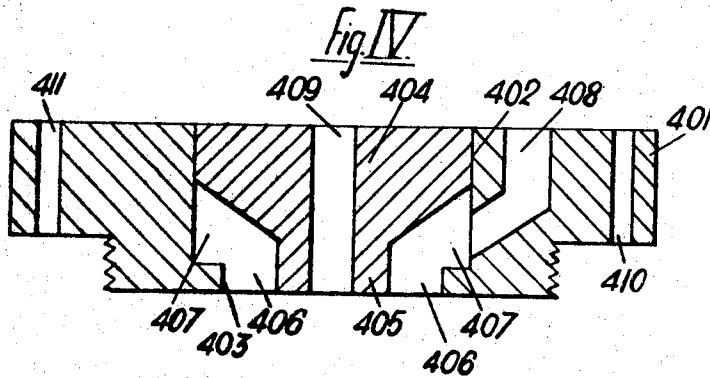
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METHODS FOR THE PRODUCTION OF HETEROFILAMENTS

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Inventors
Reginald Montague Lodge
Dewi Madoc Jones
By
Cushman, Parry & Cushman
Attorneys

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METHODS FOR THE PRODUCTION OF HETEROFILAMENTS

Reginald M. Lodge, The Rectory, Bryn, and Dewi M. Jones, Chapa, 22 Belgrave Road, both of Abergavenny, England

Continuation of application Ser. No. 297,305, July 24, 1963. This application June 4, 1968, Ser. No. 740,767. Claims priority, application Great Britain, July 31, 1962, 29,295/62

Int. Cl. B29f 3/10

U.S. Cl. 264—171

8 Claims

ABSTRACT OF THE DISCLOSURE

Process for manufacturing a heterotextile yarn by spinning at least two different synthetic polymer components fed separately to a spinneret assembly including a housing and screening and filtering means, the polymer components being brought together to form a liquid interface within the housing, the components being forced through the housing, including the filtering means, and spun into yarn while maintaining the interface.

This is a continuation of Ser. No. 297,305, filed July 24, 1963, and now abandoned.

This invention relates to an improved process for spinning heterofilaments.

By heterofilaments we mean composite filaments each comprising two or more segments of polymers varying as to their chemical constitution, composition, additives or degree of polymerisation fused together in a side-by-side relationship, generally referred to as "eccentric" relationship. Normally these segments continue throughout the length of the filaments, the composition of the filaments with respect to the said segments being constant.

By hetero-yarns we mean yarns comprising two or more homofilaments differing as to their chemical constitution, composition, additives or degree of polymerisation. Such yarns may also contain heterofilaments.

The process of this invention is primarily intended for use in the spinning of heterofilaments and hetero-yarns from synthetic high molecular weight polymers which can be melt spun, for example polycondensation polymers such as polyamides, polyesters, polyesteramides, polyurethanes, polycarbonates, polyureas and addition type polymers such as the polyhydrocarbons.

Processes of spinning heterofilaments whereby two different fibre-forming polymers are extruded simultaneously through the same orifice to yield side-by-side filaments are well known in the art. However such processes invariably involve the use of complicated spinneret assemblies, particularly in melt-spinning processes where the molten polymer is required to pass through filtering media, wherein septa are provided for the separate components which are to constitute the heterofilament such that a liquid interface is formed only at a point near to, or actually within, the spinneret orifice, alternatively the components are fused together immediately after extrusion. Spinneret assemblies of this type are complex and hence are expensive and difficult to reproduce accurately, furthermore their complexity makes them difficult to clean. Because of this complexity of the prior art spinneret assemblies the processes for spinning heterofilaments are also necessarily complicated and difficult to control.

In the spinning of hetero yarns, for example two yarns comprising melt dyed filaments of different colours which may be used to produce a marl effect in a fabric manufactured from the yarn, it is usual to spin and further process the component filaments of each yarn separately and then finally to combine the yarns by, for example,

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doubling. The necessity for introducing an extra step such as doubling in the process increases the cost of the yarn, and hence it would be an advantage if the components could readily be combined at spinning. Furthermore by combining the filaments immediately after spinning improved marl effects are obtained in the fabric since the differently coloured filaments are randomly intermingled in the yarn, whereas when two yarns are doubled the filaments of each yarn remain together and there is no intermingling. Varying effects can be obtained by over-dyeing fabrics containing these yarns.

It is known that if two viscose liquids are brought together merely by pouring one liquid into the other, or forcing one liquid through the other, little mixing occurs and in fact the two liquids tend to maintain their separate identities.

We have now found that if two molten polymers are introduced separately into a conventional melt spinning filter pack they appear at the spinneret substantially without any mixing having occurred. If the aforementioned spinneret has orifices which can be aligned with the molten polymer interface a heterofilament comprising the two polymers in a side-by-side relationship is obtained. Alternatively if the spinneret has two series of orifices which are not aligned with the molten polymer interface then a hetero yarn consisting of filaments of the two homo-polymers may be obtained. By using a spinneret which is a combination of the two aforementioned spinnerets, i.e. it has orifices which are aligned with the molten polymer interfaces and additionally has two series of orifices which are not so aligned, and the molten polymers are introduced into the filter pack at substantially the same rates of volume flow then a heteroyarn consisting of homofilaments, i.e. filaments consisting wholly of one polymer, and heterofilaments is obtained. If, in this latter instance, the polymers differ in respect of added colouring matter, i.e. pigment, the hetero yarn which is obtained is particularly useful in the manufacture of fabrics in which a marl effect is required.

Accordingly, therefore, the present invention provides in one aspect a process for the manufacture of textile yarns from at least two synthetic polymer components wherein the said polymer components, in a viscose liquid state, are separately metered into a spinneret assembly comprising a cover, housing and spinneret plate, allowed to meet and form at least one liquid interface within the said spinneret assembly and are extruded through orifices contained in the spinneret plate and formed into filaments which are subsequently drawn to orient them and wound up in the form of a yarn.

Preferably the polymer components in the viscose liquid state are molten and, having formed a liquid interface or liquid interfaces within the spinneret assembly, are forced through a filtering medium prior to extrusion. The filaments formed by the extrusion may then be solidified by a transverse blast of air before being combined together.

The invention includes the heterofilaments, hetero yarns, which may contain heterofilaments, and other textile yarns which may be made according to this process and the apparatus for carrying out the invention.

The aforementioned heterofilaments and hetero-yarns may also contain a component or components which are potentially adhesive, i.e. can be rendered adhesive, e.g. by heat or chemical means, under conditions which leave the other component or components non-adhesive. Fabrics, knitted, woven or non-woven, manufactured from such yarns may be strengthened by causing the potentially adhesive components to bond the filaments of the yarns together at cross-over points. Alternatively, or additionally, the components of the yarns may differ in respect of their degree of shrinkage. By subjecting such yarns to

a shrinkage treatment, e.g. immersion in boiling water, useful bulked yarns may be obtained. Again one or more of the components in the yarn may be an elastomer or a potential elastomer.

The process of this invention will now be more fully described with reference to the accompanying drawings. It is to be understood that such description is included merely by way of illustration and is in no way intended to limit the scope of the invention.

In the drawings:

FIG. 1 represents a cross-section of a spinneret assembly which may be used in the process of this invention, the cross-section being taken through an orifice in the spinneret plate;

FIGS. 1(a), (b), (c) and (d) are examples of orifice dispositions in spinneret plates which may be used with the spinneret assembly of FIG. 1;

FIG. 1(e) represents a cross-section of a side-by-side heterofilament produced by the process of this invention;

FIG. 2 represents diagrammatically a convenient design of twin melter which may be employed in conjunction with the spinneret assembly of FIG. 1;

FIG. 3 is a cross-section of a modified cover which allows one polymer component to be introduced into the spinneret assembly between two other polymer components which may be the same or different;

FIG. 3(a) is an example of a convenient design of spinneret plate for use in conjunction with the cover of FIG. 3;

FIG. 4 is a cross-section of another modified cover to enable the polymer components to be introduced into the spinneret assembly in a sheath and core arrangement; and

FIG. 4(a) is an example of a convenient design of spinneret plate for use in conjunction with the cover of FIG. 4.

In FIG. 1 a circular pack cover 1 containing polymer inlet ports 2 and 3 spaced along a diameter thereof and equidistant from the centre, is screwed into an internally threaded spinneret pack holder 4 against gaskets 5. The lower portion of the spinneret pack holder is externally threaded and has screwed thereon an annular spinneret plate holder 6 carrying a spinneret plate 7 which has parallel main feed channels 10 positioned equidistant from the centre of the plate and a cross channel 9 which intersects the main feed channels at right angles. An orifice 8 is positioned in the bottom of the cross channel 9 such that its centre lies on a vertical line passing through the centre of cover 1. A bottom screen 11 lies on the upper surface of the spinneret plate 7, the holder 6 being screwed up against gaskets 12. The space 13 above the bottom screen 11 is filled with a finely divided sand or some other suitable filtering medium over which is placed top screen 14. The assembly is bolted on to a suitable melter unit by bolts which pass through holes 11 and 12 in cover 1.

A suitable twin melter unit for supplying molten polymers to the inlet ports 2 and 3 of FIG. 1 is shown in FIG. 2. This unit comprises two top assemblies 220 having polymer kettles 221, polymer chip inlet shoots 222 to which are attached hoppers (not shown), grid melters 223, steam inlet pipes 224, melt blocks 225 containing booster pumps (not shown), melt pools 226, molten polymer supply tubes 227 leading to meter pumps 228 and a distribution plate 229 which contains molten polymer supply ducts 230 and bolt holes 234. The position of the spinneret assembly in relation in the melter unit is represented by box 231, the said assembly being bolted onto the distribution plate 229.

The spinneret assembly and meter pumps are enclosed within a dowtherm heated jacket 232, to the base of which is bolted an electrically heated platen 233.

Considering one top assembly only, polymer chips are fed from the hopper via the inlet shoot 222 into the polymer kettle 221 in which an atmosphere of steam is maintained. The polymer chip falls down into the melt grid

223 and the melt block 225 and melted. Molten polymer runs into the melt pool 226 and thence under pressure from the booster pump to the meter pump 228. The meter pump maintains a regular supply of molten polymer at the required rate to the spinneret assembly 231 via the supply duct 230. Steam is passed into the melt grid 223 by the steam inlet pipe 224 to maintain an oxygen free atmosphere. Waste steam passes out of a spout (not shown) at the top of the polymer kettle 221.

Referring back to FIG. 1, molten polymer from the polymer supply ducts 230 of twin melter unit just described pass into the spinneret assembly through the cover 1 via inlet ports 2 and 3. The molten polymers meet to form a liquid interface as they pass through the top screen 14 which liquid interface then passes (provided that the polymers have substantially the same melt viscosities and are introduced at the same rates of volume flow), through the filtering medium, substantially along the dotted line 15, the bottom screen 11 and into channels 9 and 10, of the spinneret pulse 7, which allow a smooth even flow of polymers into the orifice 8, whence they are extruded as a heterofilament having a cross-section composed of substantially equal proportions of each polymer.

The use of the above equipment in the process of this invention is further illustrated in the following example.

EXAMPLE 1

Polyepsilon caprolactam and polyhexamethylene adipamide, containing 0.2% TiO_2 , polymers, were supplied to the twin melter unit of FIG. 11 in the form of chips, melted and the molten polymers passed to the spinneret assembly of FIG. 1 in the manner described above. The molten polymers formed an interface within the filter pack and a heterofilament having a spun denier of 52 and comprising equal proportions of the two polymers was extruded through the spinneret orifice 8. The monofilament was wound up at 1012 ft./min. and subsequently cold drawn at a speed of 712 ft./min. at a draw ratio of 4.0 to give a filament having a denier of 13, a tenacity of 3.67 and an extension to break of 29.6%.

Cross-sections of three such filaments are shown in FIG. 1(e), in which 61 represents the polyhexamethylene adipamide component and 62 the polyepsilon caprolactam component.

The composition of the heterofilament with respect to the two components can be varied by varying the rate of volume flow of the individual molten polymers into the spinneret assembly by adjustment of the meter pumps. By such adjustment a heterofilament comprising about 80% of polyhexamethylene adipamide and 20% of polycaprolactam can be obtained.

The spinneret plate 7, of FIG. 1 can be replaced by other spinneret plates having suitable orifice layouts.

Examples of such spinnerets are shown in FIGS. 1(a), 1(b), 1(c) and 1(d).

The spinneret of FIG. 1(a) consists of a circulate plate 21 containing main polymer channels 22 and cross channels 23, orifices 24 are located in the bottom of cross-channels 23 midway between main channels.

The spinneret of FIG. 1(b) comprises a circular plate 31 containing 5 rows of spinneret orifices 32, 33, 34, 35 and 36 having 6, 7, 8, 7 and 6 orifices per row respectively. The rows of orifices are joined by diagonal cross-channels 37.

The spinneret of FIG. 1(c) comprises a circular plate 41 containing concentric channels 42, 43, 44 and cross channel 45 in which are located orifices 46, the number of orifices per channel being 6, 12 and 16 respectively.

The spinneret of FIG. 1(d) also comprises a circular plate 51 containing 8 parallel rows of channels 52 containing orifices 53. The number of orifices per channel is 3, 7, 10, 10, 10, 10, 7 and 3.

Using the spinneret of FIG. 1(a) in conjunction with the apparatus of FIGS. 1 and 2 a multi-heterofilament

yarn can be obtained following the procedure outlined above. Care must be taken, however, to ensure that the orifices in the spinneret plate are aligned with polymer interface, i.e. they should be at right angles to the line joining the centres of the polymer inlet ports. The line followed by the liquid polymer interface as it passes through the filtering medium of FIG. 1 will depend, assuming equal rates of volume flow, on the melt viscosities of the polymers being used. Thus with two polymers having widely differing melt viscosities the interface will be pushed over to the side of the filtering medium through which the low viscosity polymer is flowing. Providing, however, that the interface remains reasonably parallel to the line of the spinneret orifices the resulting heterofilaments will, on average, be composed of substantially equal proportions of each polymer.

The drawn heterofilaments described above are suitable for forming into woven or knitted textile articles. They are also particularly suitable, either in continuous filament or staple fibre form, for forming into non-woven fabrics with or without other filaments or fibres. The strength of such non-woven fabrics may be enhanced by heating to fuse the polycaprolactam component, which in this instance is the potentially adhesive component, and thus bond the fibres together at their cross-over points.

The use of the other spinnerets described above will now be illustrated in the following examples.

EXAMPLE 2

In this example the apparatus of FIGS. 1 and 2, substituting the spinneret of FIG. 1(b), was used in the manner previously described. The polymers employed were polyhexamethylene adipamide containing 0.2% TiO_2 and polyhexamethylene adipamide containing 2% of a red pigment. The polymers had melt viscosities of 394 and 520 poises and relative viscosities of 33 and 34 respectively. The spinneret plate was fitted, and the speed of the meter pumps adjusted so that the polymer interface was aligned with the centre row of holes in the spinneret plate.

A 34 filament hetero yarn consisting of 13 red, 13 white and 8 heterofilaments was obtained. The heterofilaments consisted of red and white polymer in a side-by-side relationship. The yarn was drawn at 1500 ft./min. at a draw ratio of 3.0 to give a 70 denier 34 filament (70/34) hetero-yarn. Samples of this yarn were knitted and woven into fabrics which exhibited a desirably fine and uniform marl effect.

Samples of a yarn containing 13 white and 13 red filaments, obtained by doubling separate red and white yarns at drawing, were knitted into fabrics which exhibited only a poor and patchy marl effect.

EXAMPLE 3

The experiment of Example 2 was repeated using polyhexamethylene adipamide chips containing 2% of a red pigment and polyhexamethylene adipamide chips containing 2% of a green pigment. A hetero-yarn consisting of 13 red, 13 green and 8 heterofilaments composed of substantially equal proportions of red and green polymer in a side-by-side relationship, was obtained and wound up in the normal manner. The yarn was drawn at 1500 ft./min. at a draw ratio of 3.0 to yield a 70/34 hetero yarn.

One sample of yarn was false-twist bulked and knitted into a fabric, the second sample of yarn was knitted into a flat fabric. Both fabrics had a fine uniform colour textured marl which could not be obtained merely by doubling yarns either before or after drawing.

EXAMPLE 4

The apparatus of FIGS. 1 and 2 was employed using the spinneret of FIG. 1(c). Hetero-yarns were spun according to the method of Example 2 using polyhexamethylene adipamide containing 0.2% TiO_2 and polyhexamethylene containing 3.0% of a black pigment. The speeds of the meter pumps were varied to alter the position of

the colour interface with respect to the orifices in the spinneret plate and so alter the composition of the hetero yarns. Hetero-yarns containing 14 black, 14 white filaments and 6 heterofilaments, 14 black, 11 white filaments and 9 heterofilaments, 11 black, 15 white filaments and 8 heterofilaments were obtained in this way.

The above hetero-yarns were drawn at a draw ratio of 3 and a speed of 1500 ft./min: the drawn yarns had tenacities in excess of 4 and extension to break of about 27%.

Fabrics knitted from the above hetero-yarns in flat or bulked form exhibited a fine uniform marl effect which could not be obtained from black and white yarns by normal doubling techniques.

Because of the uniform marl effect shown in fabrics obtained from these yarns they are particularly useful as stock yarns to be knitted or woven into fabrics which are subsequently overdyed to give a variety of marl effects.

EXAMPLE 5

The apparatus and method of Example 4 was repeated using, as the two polymer components, polyhexamethylene adipamide without delustrant (right) and polyhexamethylene adipamide containing 0.2 of TiO_2 (dull). The meter pump speeds were adjusted such that a hetero-yarn consisting of 14 bright and 14 dull filaments and 6 heterofilaments, comprising substantially equal proportion of each of the two components in a side-by-side arrangement, was obtained. When knitted into a fabric which was subsequently dyed this yarn gave a pleasing lustre effect.

EXAMPLE 6

The apparatus of FIGS. 1 and 2 was employed in conjunction with the spinneret of FIG. 1(d). The polymers used were polyhexamethylene adipamide containing 2% red pigment and polyhexamethylene adipamide containing 0.2% TiO_2 . The meter pumps were adjusted such that a hetero-yarn comprising 30 red and 30 white homofilaments, no heterofilaments, was obtained which was drawn at 1500 ft./min. at a draw ratio of 3.0. Fabrics knitted and woven from this yarn had a uniform marl effect, the effect was, however, not as fine as that obtained with the yarn of Examples 2 and 3.

In FIG. 3 of the drawings a cover plate 301 is externally threaded to screw into the spinneret pack holder 4 of FIG. 1. The cover plate contains polymer inlet ports 302, 303 and 304 and bolt holes 305 to enable the cover to be bolted onto plate 229 of FIG. 2. If it is desired to introduce the same molten polymer into 302 and 304 then suitable modifications, obvious to any person skilled in the art, have to be made to the polymer supply ducts 230 in plate 229 of FIG. 2. Alternatively three different polymers can be supplied to each of the inlet ports from a suitably arranged melter assembly. Using this cover the liquid interfaces are formed between inlet ports 302 and 303 and 303 and 304. These interfaces pass through the filter pack to the spinneret plate in a substantially parallel relationship.

An example of a suitable spinneret plate for use with this cover is shown in FIG. 3(a). In this drawing a circular spinneret plate 311 contains two parallel channels 312 and 313 which are spaced apart by a distance approximately 4 channel widths wide. The channels run parallel to a diameter of the spinneret plate 311 and contain orifices 314 and 315, there being 10 such orifices to each channel.

The process of this invention using the above described spinneret assembly cover will now be more fully illustrated in the following example.

EXAMPLE 7

For this example the apparatus of FIGS. 1 and 2 was modified by the replacement of the cover 1 with the cover of FIG. 3. A spinneret of the type depicted in FIG. 3(a) was used, care being taken to ensure that the rows

of orifices were correctly aligned with the inlet ports of the cover, i.e. that the rows of orifices were at right angles to the line of centres of the inlet ports. Suitable adjustments were made to the polymer ducts 230 of FIG. 2 to allow one molten polymer to be delivered to inlet ports 302 and 304 of FIG. 3 and the second molten polymer to inlet port 303 only.

Polyhexamethylene adipamide containing 0.2% TiO₂ and having a melt viscosity of 394 poises and a relative viscosity 33.5 was introduced into the spinneret assembly through inlet ports 302 and 303 and an interpolymer comprising 80 parts by weight of polyhexamethylene adipamide and 20 parts by weight of polyepsilon caprolactam having a melt viscosity of 400 poises and a relative viscosity of 33.9 was introduced through inlet port 303. The meter pumps were run at equal speeds and the 20 filament yarn, composed of side-by-side heterofilaments containing substantially equal proportions of each of the two polymers, obtained by this process was wound up at 1548 ft./min. The yarn had a spun denier of 265 and was subsequently drawn at 580 f.p.m. and a temperature of 110° C. using a draw ratio of 3.99 to give a 70/20 drawn yarn having a tenacity of 3.83 g.p.d. and an extension to break of 32.7%.

Heterofilaments containing these components are particularly useful, either as continuous filaments or staple fibre, in the manufacture of non-woven fabrics. In such fabrics advantage may be taken of the crimpability of the filaments, the interpolymer component having a very high shrinkage, and of the fact that the interpolymer component may be conveniently rendered adhesive under conditions which have relatively little effect on the polyhexamethylene adipamide component.

It will be readily seen by those skilled in the art that additional orifices may be included in the spinneret employed in the Example in order that hetero-yarns may be obtained. Such hetero-yarns may consist of heterofilaments and homofilaments of either one or other of the polymer components or heterofilaments and homofilaments of both components, depending on the positioning of the additional orifices. In these instances adjustments will have to be made to the meter pump speeds in order to allow for the production of heterofilaments and homofilaments in the required manner.

Hetero-yarns containing the above components both as homofilaments and heterofilaments yield useful bulked yarns when subjected to a shrinkage treatment. Owing to the intermingling of the component filaments the yarn is bulkier and more stable than a similar yarn obtained by doubling yarns of the two types of filaments together and then shrinking in the manner of prior art proposals.

In FIG. 4 there is described yet another design of cover which may be employed with the apparatus of FIG. 1. This cover allows two molten polymers to be introduced into the spinneret assembly of FIG. 1 so that they form an annular interface within the said assembly, and comprises an outer case 401 which is externally threaded to screw into the spinneret pack holder 4 of FIG. 1. The outer case contains a circular hollow portion 402 through the bottom of which is drilled a concentric hole 403 of smaller diameter. A hollow insert 404 fits tightly into the hollow 402, the lower end 405 of insert 404 being of smaller diameter than the hole 403 through which it passes leaving an annular space 406 between the sides of the hole and the insert. The top and bottom faces of the insert are flush with the top and bottom faces of the outer case, and the insert is so shaped that a second annular space 407 is left between the insert and the side of the hollow portion of the outer case. A polymer inlet duct 408 passes from the top face of the outer case to the annular space 407. A second polymer inlet duct 409 passes through the centre of the insert. Holes 410 and 411 are provided to enable the cover to be bolted onto the plate 229 of FIG. 2. Molten polymers are metered from the meter pumps 28 of FIG. 1 via the suitably modified polymer supply ducts

230 in plate 229 to the polymer inlet ducts 408 and 409 of FIG. 4. One component polymer enters the spinneret assembly via the inlet duct 408 and passes into the annular space 407 and then through the annular space 406, and the other component polymer enters via the inlet duct 409. These polymers then form an annular interface within the spinneret assembly, the polymer entering through the duct 409 being on the inside and that entering through duct 408 being on the outside of the said interface.

An example of a suitable spinneret for use in conjunction with this cover is shown in FIG. 4(a). The spinneret comprises a circular plate 421 containing a single circular channel 422 having the same centre as the plate. Twelve orifices 433 are located in the channel 422.

The use of the above cover and spinneret is more fully illustrated in the following example:

EXAMPLE 8

In this example the apparatus of FIGS. 1 and 2 was modified by the replacement of cover 1 with the cover of FIG. 4 and the spinneret plate 7 by that of the type shown in FIG. 4(a). The two polymer components were polyhexamethylene adipamide and an 80/20 interpolymer of polyhexamethylene adipamide and polyepsilon caprolactam. The meter pump speeds were adjusted such that side-by-side heterofilaments consisting of substantially equal proportions of each polymer component were formed. The filaments were wound up as a yarn having a denier of 264 at 1548 f.p.m. The yarn was subsequently drawn at room temperature to give a yarn having a denier of 71.3, a tenacity of 3.27 g./d. and an extension to break of 30.5.

Those skilled in the art will readily appreciate that the spinneret employed in this example can be modified to yield hetero-yarns by the inclusion of additional orifices either inside or outside the circle of orifices through which heterofilaments are spun. The hetero-yarn then obtained will, if the pump speeds are correctly adjusted, comprise heterofilaments consisting of both components and homofilaments of one or other of the components depending on where the additional orifices were placed. Alternatively as spinneret is shown in FIG. 1(c) may be employed, in which case, after the necessary adjustments have been made to the relative speeds of the meter pumps, a hetero-yarn consisting of heterofilaments and homofilaments of both components will be obtained.

It will also be appreciated that although the orifices in the spinnerets hereinbefore described are circular, they may be of any desired shape e.g. cruciform or Y-shaped. Orifices having such shapes would yield filaments having lobed cross-sections. If a two component heterofilament is spun through a cruciform shaped orifice, the resultant filament may, in cross section, have two lobes of one component and two lobes of other component.

The spinneret plates themselves need not, of course, be circular in shape, they may, for example, be rectangular if desired.

In the examples illustrating this invention polyamide systems only have been employed, the invention is not, however, limited to such systems, and any suitable combination of fibre-forming polymers may be employed; when the polymers are formed into filaments by melt spinning, the combinations should be of polymers which are normally spun at substantially the same temperature, small variations of the order of 20° C. or 30° C. can be tolerated however. If heterofilaments are to be produced then in addition it is necessary that the polymers from which it is intended to form the heterofilaments should be compatible if fibrillation of the filaments is to be avoided.

We claim:

1. A process for the manufacture of a heterotextile yarn from at least two different synthetic polymer components selected from the group consisting of polyamides,

polyesters, polyesteramides, polyurethanes, polycarbonates and polyureas which comprises:

- (a) providing a spinneret assembly including a separate inlet for each said component, a housing having an inlet screen member and filled with a filtering medium located adjacent the inlet screen member and adapted to receive said components as they are passed from said inlets, through said inlet screen member, an outlet screen member adjacent the filtering member at the bottom of the housing, an outlet in the bottom of said housing for discharging said components after they have passed through the housing, filter medium and outlet screen member and a spinneret plate with orifices therein for spinning filaments from the components so discharged from said housing;
 - (b) separately metering said polymer components in a viscous liquid state through said inlets and inlet screen member into said housing;
 - (c) allowing said components to form at least one liquid interface within said housing;
 - (d) forcing said components while maintaining said interface through the filtering medium within the housing;
 - (e) discharging the thus filtered components through said outlet screen member and housing outlet and then through the orifices in said spinneret plate to form said heterofilaments; and
 - (g) drawing and collecting said filaments.
2. The process of claim 1 wherein said filtering medium is a particulate solid medium.

3. A process according to claim 1 wherein the polymer components are in the molten state and the filaments formed by extrusion through the orifice contained in the spinneret plate are solidified by a transverse blast of air.

4. A process according to claim 1 wherein the liquid interface or interfaces formed by the polymer components within the filter medium and the orifices in the spinneret face are positioned so that they are substantially parallel and in the same vertical plane and the rates of volume flow of the polymer components are adjusted to produce heterofilaments consisting of the said polymer components in a side-by-side relationship.

5. A process according to claim 1 wherein the liquid interface formed by the polymer components within the filter medium and the orifices in the spinneret plate are disposed, with respect to each other, to produce homofilaments which consist wholly of one of said polymer components.

6. A process according to claim 1 wherein the liquid interface or interfaces formed by the polymer components within the filter medium and the orifices are disposed, with respect to each other, to produce a yarn comprising heterofilaments and homofilaments of at least one of the polymer components.

7. A process according to claim 1 wherein at least one of the polymer components includes a pigment so as to provide a yarn which gives a uniform marl effect in fabric form.

8. A process according to claim 1 wherein one of the polymer components has a greater shrinkage than the other component or components whereby the resulting yarn has potential bulking properties.

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JULIUS FROME, Primary Examiner

J. H. WOO, Assistant Examiner

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