ARTIFICIAL FILAMENT, YARN, OR THREAD

FIG. 4.

FIG. 5.

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This invention relates to artificial filaments, yarns, or threads and to their production by the extrusion of spinning solutions through jets, nozzles, or other spinning orifices.

According to the present invention, artificial filaments or threads are given a regular or systematic irregularity in denier by varying the output of the pump or pumps feeding the spinning solution to the spinning jets or nozzles, the variations in extrusion resulting in a correspondingly varying denier, which variations may occur at any desired intervals and to any desired degree, while extending any desired amount along the length of the filaments or threads.

The variation in extrusion may be effected by suitably varying the speed at which the spinning pump is driven, or by constructing the pump to give a variable output. It is important that the spinning solution follows a short path from the pumps to the jets or nozzles, and that the conduit conducting the solution to each jet or nozzle is of a rigid character, in order to prevent the damping or absorption of the pulsations before the solution reaches the jet or nozzle.

All the jets or nozzles, whether in a single meter or machine or in a series of such, which are required to produce the same quality of denier are supplied with spinning solution by similarly operating pumps which produce the same variable extrusion from all the jets or nozzles.

The variations in denier produced according to the invention may appear at regular short or regular long intervals of length or at regularly varying intervals, and variations of different degree or extent, or both, may appear at any desired intervals. Or one or more groups of irregularities may appear in regular sequence or in any desired order or at any desired intervals. Thus, for example, one or more short variations may alternate with one or more longer variations, or one or more short and long variations may alternate with short or long variations or with other groups of short and long variations, always with the object of producing a regular or systematic effect from the alternating or periodically recurring irregularities of denier of the filaments, yarns or threads. Or periodical irregularities forming groups of, for example, 2, 3, 4, 6 or 10 or more variations may occur on the filaments, yarn or threads, the groups alternating with each other or appearing in any desired order according to the effect to be produced.

It will be understood that where yarn or thread is formed by the association of a number of filaments all of which have a regular irregularity in denier which is the same for all the filaments, the variations in the individual filaments may be arranged to produce by a cumulative effect a similar regular irregularity in the denier of the yarn or thread.

The yarns or threads which have received the regular irregularities as above described may be wound or twisted and wound, for example, by means of cap-spinning devices, or centrifugal boxes.

The filaments of varying denier may be formed into yarns, either alone or twisted or doubled with threads of other natural or artificial filaments or fibres. Or they may be cut or reduced to staple lengths, either continuously with their production or subsequently thereto, and spun into yarns, either alone or mixed or blended with other natural or artificial filaments or fibres, and such spun yarns may, if desired, be twisted or doubled with the same or other yarns to form any desired type of thread.

Yarns or threads with irregular denier according to the invention impart a novel effect to fabrics or articles wholly or partly formed from them, by reason of the differential effect produced by the variations, and this effect may, moreover, be enhanced when the fabrics or articles are dyed, printed, or otherwise coloured, because of the regular irregularity of denier of the yarns or threads causing different penetration of the dyestuff or other colouring matter to be effected, a great variety of colour effects thereby being produced.

The yarns or threads of varying denier may be applied to the production of fabrics or articles, either alone or in association with yarns or threads of regular artificial silk or of other natural or artificial filaments or fibres, and may be utilized to give any desired design or pattern. They may be used, for example, in the warp and/or weft in weaving in knitting operations, for example in the production of warp-knitted fabrics; in circular hosiery or other knitting machines, in braiding or cording operations; in net or lace-making operations; or in any other fabric-forming or textile operations.

While the invention is particularly applicable to filaments or threads of varying or irregular denier, produced by the dry or evaporative method, and especially filaments or threads having as a base cellulose acetate or other cellulose derivatives, such as cellulose formate, propionate, or butyrate, thiocarbamic or alkylcarboxyalkyl esters of cellulose, methyl, ethyl or benzyl cellulose, or the condensation products of cellulose
and glycols or other polyhydric alcohols, it applies likewise to filaments or threads of varying or irregular denier produced by the wet or coagulation method, whether having a base of cellulose acetate or derivatives of cellulose, or composed of a reconstructed cellu-
lose, such as viscose, cuprammonium, or nitro-
cellulose silk.

Two forms of apparatus which may be em-
ployed in carrying the invention into effect are illus-
trated in the accompanying drawings, but it is to be understood that the following description is given by way of example only and is in no way limitative.

In the drawings:

Figs. 1, 2, and 3 illustrate one form of appa-
ратus, Fig. 2 being an end elevation of the plane
view shown in Fig. 1, and Fig. 3 a horizontal
section of the prin 21 projecting from the tall
of the pumps.

A pinion 10 secured to the shaft A engages a
pinion 11 freely mounted on the shaft B and con-
ected to a disc 12 from the face of which pro-
jects a pin 13. A pawl 14 pivotally mounted on
the pin 13 is held in engagement with a ratchet
wheel 15 by means of a spring 16, the ratchet
wheel 15 being secured to the shaft B. The shaft
B can thus be driven from the shaft A at a speed
dependent on the ratio of the gears 10 and 11.
A pinion 17 secured to the shaft A and
meshes with a gear 18 freely mounted on the
shaft B and connected to a disc 19. A ratchet
wheel 20 secured to the shaft B is arranged along-
side the disc 18, a pawl 21 mounted on a pin 22
projecting from the face of the disc 19 being
adapted to be brought into engagement with the
ratchet wheel 20. Notwithstanding the fact that, however, a spring
23 acting on the tail 24 of the pawl 21 maintains
the pawl out of engagement with the ratchet
wheel.

A cam disc 25 is mounted close to the ratchet
wheel 20 and is held against rotation by being
secured to any suitable fixed part 26 of the appa-

The herein described process and apparatus
may be employed in conjunction with or in place of any
and apparatus described and claimed In British
applications Nos. 26350/28 and 37392/28, wherein
filaments or threads of varying denier are produced
by drawing the filaments or threads at varying linear speeds in the course of their
production.

What we claim and desire to secure by Letters
Patent is:—

1. Apparatus for the production of artificial
silk comprising a spinning jet, a pump adapted to
supply spinning solution thereto, a plurality of
clutches means adapted to connect one or other of
said driving means to the pump, and control
means adapted to operate said clutch means to
alter periodically the driving means in driving
conjunction, whereby the pump is driven at a
systematically varying speed so that the spinning
solution is extruded from the spinning jet at a
consequently varying speed to form filaments
having a corresponding systematic variation in
denier.

2. Apparatus for the production of artificial
silk comprising a spinning jet, a pump adapted to
supply spinning solution thereto, a plurality of
means for driving the pump at different speeds,
a pawl and ratchet gear in connection with each
of said driving means and adapted to effect driving connection between said driving means and the pump, and control means adapted periodically to release the ratchet gear of the driving means moving at higher speed, so that the pump is driven in turn by one or other of said driving means, whereby the pump is driven at varying speed, and the spinning solution is extruded from the spinning jet at a correspondingly varying speed to form filaments having a corresponding systematic variation in denier.

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