

Dec. 22, 1936.

H. DREYFUS ET AL

2,065,124

PRODUCTION OF ARTIFICIAL FILAMENTS, YARNS, OR THREADS

Filed Sept. 4, 1929

FIG. 1.

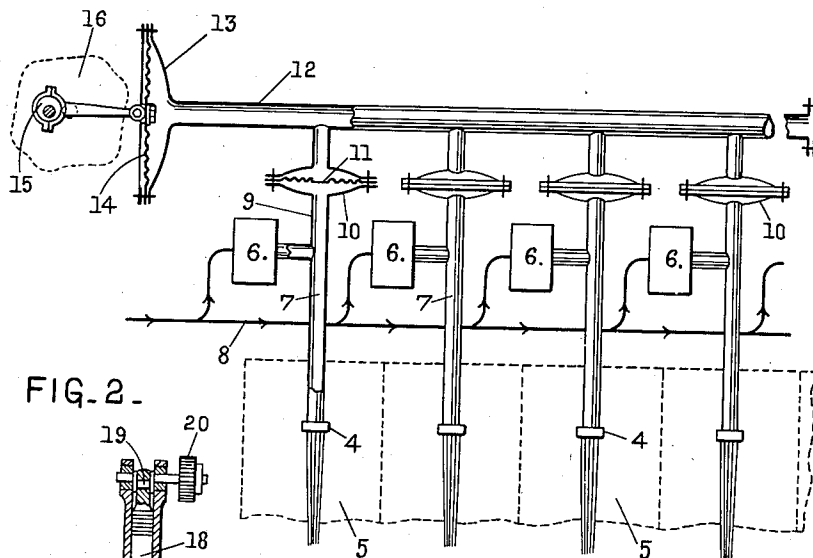


FIG. 2.

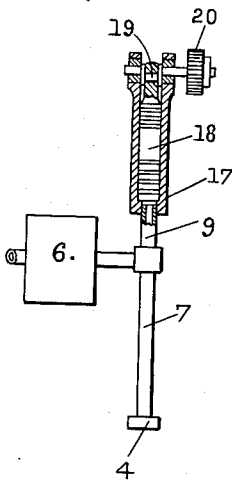
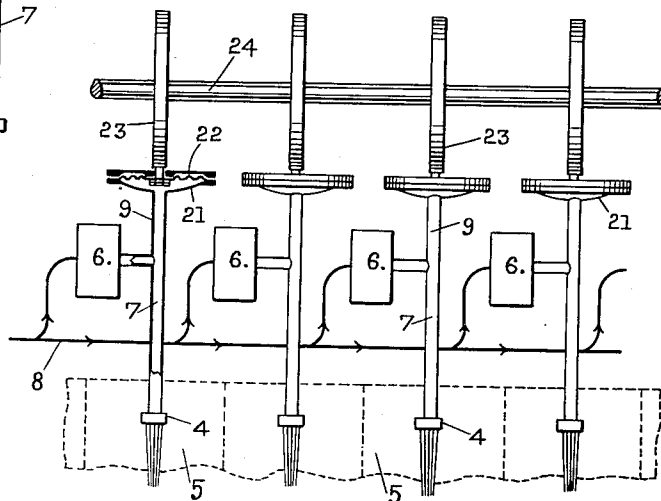


FIG. 3.



HENRY DREYFUS
WILLIAM A. DICKIE
WILLIAM I. TAYLOR
Inventors

Walter C. W. Levinson
Attorneys

UNITED STATES PATENT OFFICE

2,065,124

PRODUCTION OF ARTIFICIAL FILAMENTS,
YARNS, OR THREADS

Henry Dreyfus, London, and William Alexander
Dickie and William Ivan Taylor, Spondon, near
Derby, England, assignors to Celanese Corpo-
ration of America, a corporation of Delaware

Application September 4, 1929, Serial No. 390,401
In Great Britain September 13, 1928

5 Claims. (Cl. 18—8)

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 invention, artificial filaments or threads are given a regular or systematic irregularity in denier by the production of pulsations in the delivery of spinning fluid to the jets, nozzles, or other spinning orifices, suitably actuated members such as diaphragms, pistons, or plungers, being caused to vibrate, reciprocate, or oscillate in contact with the spinning solution. Variations in the extrusion from the spinning orifices thus result, the variations occurring at any desired intervals and to any desired degree, while extending any desired amount along the length of the filaments or threads.

Any desired means such as cams or eccentrics may be employed for actuating the pulsation-producing devices, each device being actuated individually or common actuating means may be employed for any desired number of devices. Thus, diaphragms exposed on one side to the spinning solution in each delivery pipe may be caused to vibrate by pulsations transmitted through a fluid acting on their other side, a suitably actuated plunger or diaphragm being employed to produce the pulsations in the transmitting fluid.

It is important that the conduit conducting the spinning solution to each jet or nozzle be of a rigid character in order to prevent the damping or absorption of the pulsations before the solution reaches the jet or nozzle. For the same reason, the path followed by the solution from the pulsation-producing device to the jet or nozzle should be as short as possible.

All the jets or nozzles, whether in a single metier or machine, or in a series of such, which are required to produce the same quality of filaments have similarly operating devices to produce the same variable extrusion from all the spinning orifices, and, preferably, a common operating device is employed in connection with all such jets and nozzles in each metier or machine.

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 groups of 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, yarns, 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 formed therefrom.

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 dye-stuff 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 operations; 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 applies particularly 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 alkoxy-alkacyl 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 other organic derivatives of cellulose, or composed of a reconstituted cellulose, such as viscose, cuprammonium, or nitrocellulose silk.

Apparatus suitable for carrying out the invention is illustrated in the accompanying drawing, but it is to be understood that the following description is given by way of example only and is in no way limitative.

Referring to the drawing:—

Fig. 1 shows diagrammatically in part section means for producing a variable flow of spinning solution by the use of diaphragms in contact with the spinning solution, several diaphragms being actuated by common means.

Fig. 2 shows the application of a plunger to the production of the variable flow in connection with a single jet, and

Fig. 3 shows diagrammatically cam-actuated diaphragms each operating in connection with a single jet.

In Fig. 1, spinning jets 4 arranged in cells 5 are each connected to pumps 6 by means of rigid pipes 7, the pumps receiving spinning solution from a header 8. Connected by rigid branches 9 to the pipes 7 are chambers 10, each containing a diaphragm 11. The chambers 10 are connected on the sides remote from the branches 9 to a rigid header 12 containing any suitable fluid, such as oil. The header 12 is connected to a diaphragm chamber 13, the diaphragm 14 in which is adapted to be vibrated by any suitable means, such as the eccentric 15, or the cam 16. Pulsations produced in the fluid contained in the header 12 are transmitted by the fluid to the diaphragms 11 and imparted thereby to the spinning solution in the branches 9. The distance from each pump 6 to its jet 4 is kept as short as possible.

In Fig. 2, a jet 4 receives spinning solution from a pump 6 through a pipe 7, the pipe 7 being connected by a branch 9 to a cylinder 17, in which operates a plunger 18 driven by means of a crank 19. Any desired number of plungers 18 may be driven by common means, for example, by gears on a common shaft engaging pinions 20 on the shafts of the cranks 19.

A similar mode of producing the pulsations is shown in Fig. 3, the plunger, however, being replaced by a diaphragm. Each branch 9 is connected to a diaphragm chamber 21, the diaphragm in each chamber being operated by a cam 23. Each cam 23 may be independently driven or a number of cams may be mounted on a common shaft 24. The peripheries of all the cams may be identical for the production of the

same type of filament from each jet, or different cams may be employed in connection with each jet.

The herein described process and apparatus may be used in conjunction with the processes and apparatus described and claimed in British Patent applications Nos. 26,350 of 1928, 37,392 of 1928 and 21,748 of 1929, wherein respectively filaments or threads of varying denier are produced by drawing the filaments or threads at varying linear speeds in the course of their production, or by pumping spinning solution at a varying rate to the spinning orifices.

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

1. Apparatus for the production of artificial silk filaments, comprising a spinning jet, a rigid-walled passage communicating therewith, means for feeding spinning solution through the said passage to the said jet and a member in the said passage adapted to vibrate in contact with the spinning solution therein, whereby impulses are imparted to the spinning solution and the spinning solution is extruded from the jet at a varying rate to form continuous, self-supporting filaments having a corresponding systematic variation in denier.

2. Apparatus for the production of artificial silk filaments, comprising a spinning jet, a rigid-walled passage communicating therewith, means for feeding spinning solution through the said passage to the said jet, a diaphragm in the wall of the said passage, and means for reciprocating the said diaphragm in contact with the spinning solution, whereby the spinning solution is extruded from the jet at a varying rate to form filaments having a corresponding systematic variation in denier.

3. Apparatus for the production of artificial silk filaments, comprising a spinning jet, a rigid-walled passage communicating therewith, means for feeding spinning solution through the said passage to the said jet, a diaphragm in the wall of the said passage and a cam adapted to engage the said diaphragm and cause it to reciprocate in contact with the spinning solution, whereby the spinning solution is extruded from the jet at a varying rate to form filaments having a corresponding systematic variation in denier.

4. Apparatus for the production of artificial silk filaments comprising a spinning jet, a rigid-walled passage communicating therewith, means for feeding spinning solution through the said passage to the said jet, a diaphragm in the wall of the said passage, and means for applying fluid pressure to the outside of the said diaphragm to cause it to reciprocate, whereby the spinning solution is extruded from the jet at a varying rate to form filaments having a corresponding systematic variation in denier.

5. Apparatus for the production of artificial silk filaments comprising a spinning jet, a rigid-walled passage communicating therewith, means for feeding spinning solution through the said passage to the said jet, and a plunger adapted to reciprocate in and out of the said passage, whereby the spinning solution is extruded from the jet at a varying rate to form continuous, self-supporting filaments having a corresponding systematic variation in denier.

HENRY DREYFUS.
WILLIAM ALEXANDER DICKIE.
WILLIAM IVAN TAYLOR.