

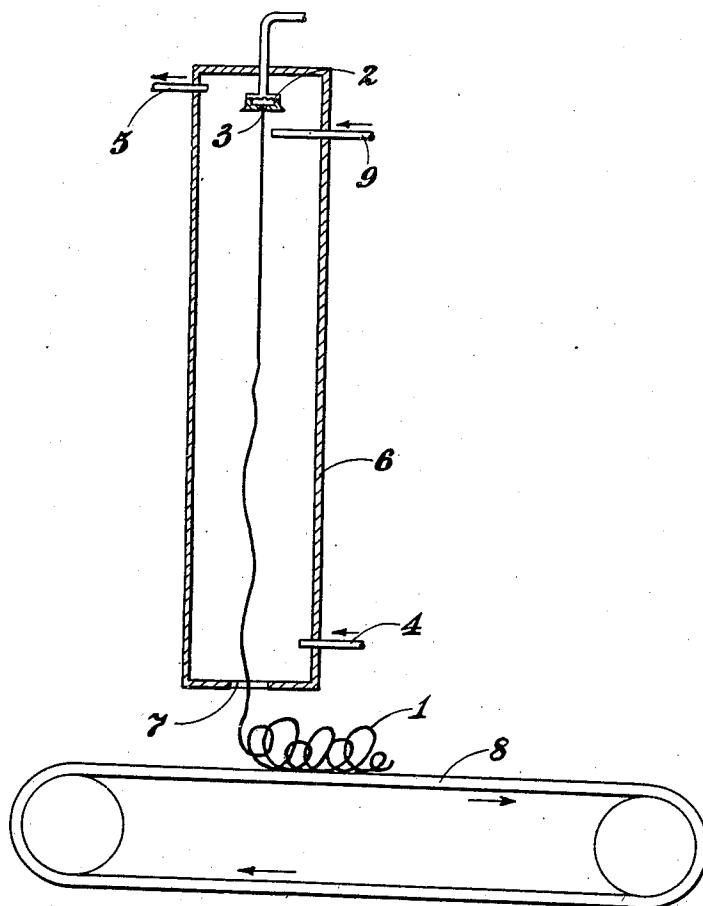
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H. M. AVERNS

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METHOD FOR THE MANUFACTURE AND PRODUCTION OF CURLED MONOFIL

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Inventor

HARRY MAURICE AVERNS

by

Howson and Howson
Attorneys

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METHOD FOR THE MANUFACTURE AND PRODUCTION OF CURLED MONOFIL

Harry Maurice Avern, Coventry, England, assignor to Courtaulds Limited, London, England, a British company

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1 Claim. (Cl. 18—54)

This invention relates to the manufacture and production of curled monofil consisting of an organic acid ester or ether of cellulose, for example, cellulose acetate. By the term "monofil" in this specification I mean a thread consisting of a single filament.

Methods have already been proposed for producing wave or curl in threads, for example by acting directly on the thread in a plastic condition with mechanical devices such as fluted rollers, or by imparting to the coagulating medium or the spinneret a swirling or eddying motion.

According to the present invention the process for the production of curled monofil of at least 100 denier comprises extruding a solution of a cellulose derivative downwards through an orifice into an evaporative medium, directing a steady continuous current of evaporative medium on to one side of the extruded solution just below the orifice and allowing the resulting filamentary product to fall under its own weight, without subjecting it to any other tension, on to a collecting device.

The cellulose ester may be, for example, cellulose acetate, and a suitable solution for extrusion according to the invention is made by dissolving about 25 parts thereof in 100 parts of an organic solvent which is easily removable by evaporation, such as acetone.

Each jet or extrusion device may have one or more orifices through which the solution is extruded in order to form one or more curled monofils respectively. If there is more than one orifice, they should be spaced so far apart that the issuing streams of solution do not come into contact with each other before a substantial proportion of the solvent has evaporated. Each jet is supplied with solution in the manner well known in the art and is disposed with its face substantially horizontal and on the under side so that the solution extruded therefrom falls freely in a continuous stream.

By the term "evaporative medium" I mean a gas or mixture of gases in which the said solvent readily evaporates from the said solution. It will normally consist of warm air; for example, when the organic solvent is acetone, air at a temperature of about 30° centigrade may be used, although higher temperatures for example up to 60° to 65° centigrade may also be used. The said medium is preferably enclosed in or circulated through a suitable cell of the kinds well known in the art. If desired, steps may be taken to recover the solvent evaporated from the solution.

The current of evaporative medium directed on to one side of the extruded solution may be the same as that into which the solution is extruded or not. It may be heated if desired, and a greater degree of curl is generally obtained in the monofil if the medium directed on to the solution is at a higher temperature than the solution or the evaporative medium into which it is extruded. When extruding a solution of cellulose acetate in acetone at about 30° centigrade into an atmosphere at about 30° centigrade, a suitable temperature for the air being directed on to the extruded solution just below the jet is about 65° centigrade.

The said current of evaporative medium may be directed on to the extruded solution at a point a short distance, for example, less than an inch, below the jet, for instance through a tube, the outlet of which is near to one side of the said solution just below the jet. A similar result may however also be obtained by applying a vacuum to a tube situated on the opposite side of the solution. The rate of flow should not be so strong as to disperse the solution or to displace the stream of solution substantially from the vertical path in which it is falling. The said rate of flow may be varied according to the denier of the monofil being produced. A suitable rate of flow when forming monofil of 250 denier is from 1 to 2 cubic feet per minute supplied under pressure through a tube about one-eighth of an inch in diameter.

The monofil is collected on, or in, a device such that substantially no tension other than that due to its own weight is exerted on it. It may be, for example, a plate, box, platform, table or transport belt. It may be at a raised temperature to assist evaporation, and may be slowly moved horizontally so that a mass of coiled monofil of any desired length may be obtained.

As the solvent evaporates from the extruded solution a filamentary product is formed which curls up into a mass of small coils or curls. This curling may occur while the monofil is falling or after its collection, depending upon the amount of solvent to be evaporated, the denier of the filament, the temperature of the evaporative medium and the distance of the collecting device below the jet. The desired effect is readily obtained when the denier of the filament is from about 200 to 250 and is also obtained at deniers as low as 100 and above 250. In any case the relation between the denier of the filament and the distance of the jet above the collecting device must be such that the weight of extruded

material hanging from the jet is sufficient to overcome the resistance of the evaporative medium and maintain continuity in the monofil.

The accompanying diagrammatic drawing illustrates one form of apparatus used for carrying the invention into effect, although the invention is not restricted to the use of the apparatus shown.

A curled monofil **1** is formed by the extrusion of an approximately 25 per cent solution of cellulose acetate in acetone through a jet **2** provided with a single orifice **3**, into air at a temperature of about 30° centigrade circulated by means of inlet and outlet pipes **4** and **5** respectively, through a cell **6**. The jet **2** is situated at the top of the cell **6** and in the bottom of the cell an opening **7** is provided through which the falling monofil emerges. It is then collected on a slowly moving endless band **8**. Air at a temperature of about 65° centigrade is caused to flow at the rate of about 2 cubic feet per minute through a tube **9** situated just below the jet **2**. The air flowing through this tube is directed

against one side of the descending stream of solution. As the said stream falls through the cell, acetone is evaporated from it and at a certain stage the following product attains a slightly waved form. As more acetone evaporates the curling becomes more pronounced until when substantially all the acetone has been evaporated, the product consists of a mass of small coils or curls.

10 What I claim is:

A process for the production of curled monofil of at least 100 denier which comprises extruding a solution of a cellulose derivative taken from the group of organic esters and ethers of cellulose downwards through an orifice into an evaporative medium, directing a steady continuous current of evaporative medium on to one side of the extruded solution just below the orifice and allowing the resulting filamentary product to fall under its own weight, without subjecting it to any other tension, on to a collecting device.

HARRY MAURICE AVERNS.

CERTIFICATE OF CORRECTION.

Patent No. 2,242,988.

May 20, 1941.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 4, for the word "following" read --falling--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of June, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.