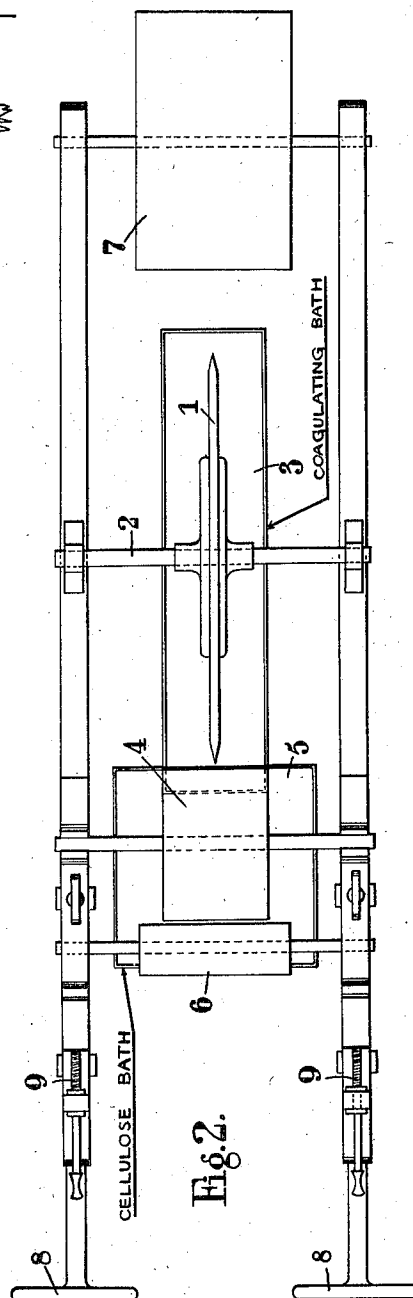
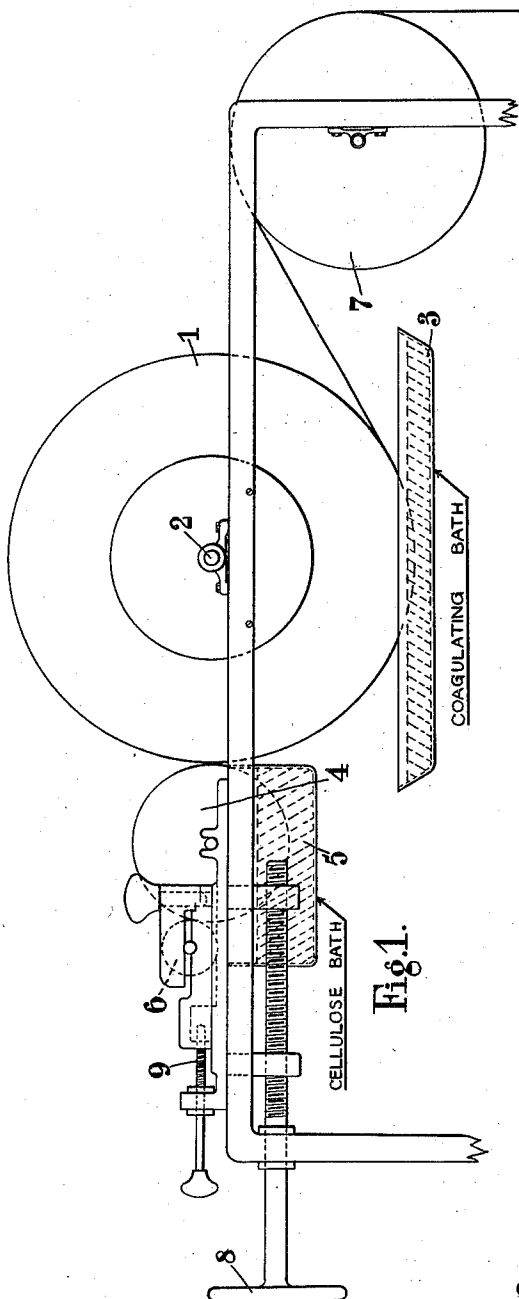


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T. L. SHEPHERD
PRODUCTION OR MANUFACTURE OF THREADS OR FILAMENTS
OF ARTIFICIAL SILK AND THE LIKE
Filed May 28, 1935

2,125,032

2 Sheets-Sheet 1



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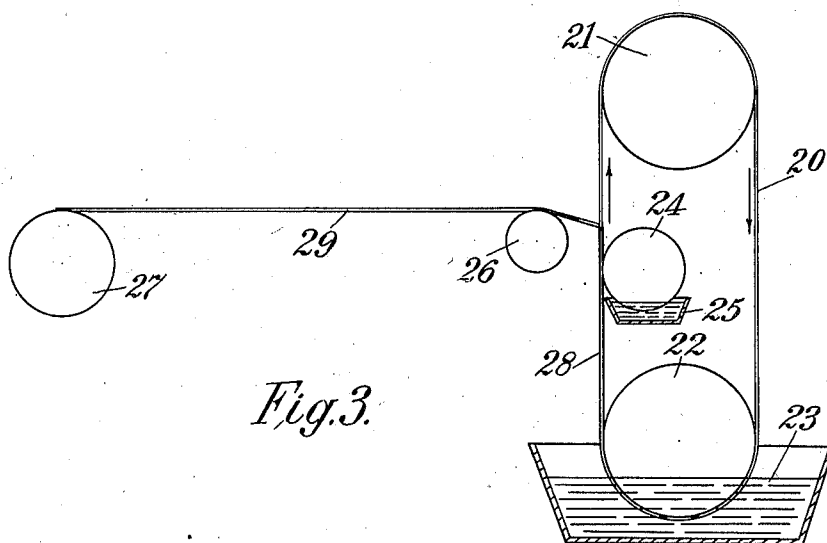


Fig. 3.

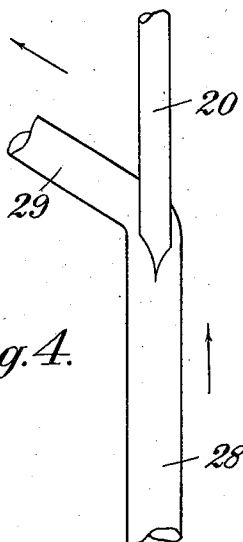


Fig. 4.

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UNITED STATES PATENT OFFICE

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PRODUCTION OR MANUFACTURE OF
THREADS OR FILAMENTS OF ARTIFICIAL
SILK AND THE LIKE

Thomas Lewis Shepherd, London, England

Application May 28, 1935, Serial No. 23,924
In Great Britain May 29, 1934

4 Claims. (Cl. 18—54)

This invention relates to the production or manufacture of filaments, threads and tapes of regenerated cellulose or cellulose derivatives. By means of existing known methods a stream of solution of cellulose, such as those known as viscose, cuprammonium, and the like, is extruded from a nozzle or a spinneret into a coagulant whereby the viscose or the like shall be coagulated. The thread thus produced is then led away from the coagulating bath for further treatment.

Such a method has the disadvantage of being entirely dependent upon the uninterrupted stream of solution flowing through a nozzle into the coagulant which has a tendency to cause the extruding nozzle to become clogged very easily, so that thereby breakages are caused in the thread already formed and not yet led out of the bath.

The invention consists in a process for the manufacture of filaments or the like of cellulose or cellulose derivatives, which consists in applying solution to a support, coagulating the solution, and withdrawing the coagulum from said support.

The invention also consists in a process for the manufacture of filaments or the like of cellulose or cellulose derivatives, which consists in applying solution to a support, coagulating the solution, and withdrawing the coagulum from said support under tension.

The invention also consists in a process for the manufacture of filaments or the like of cellulose or cellulose derivatives, which consists in applying solution to a support, coagulating the solution by heat, and withdrawing the coagulum from said support.

The invention also consists in a process for the manufacture of filaments or the like of cellulose or cellulose derivatives, which consists in applying solution to a disc, rotating the disc, immersing the solution in coagulant, and removing the coagulum from the disc.

The invention also consists in a process for the manufacture of filaments or the like of cellulose or cellulose derivatives, which consists in applying solution to a wire, coagulating the solution and withdrawing the coagulum from said support.

The invention also consists in a modification of the process as in the preceding paragraph but one in which coagulant is applied to the disc, which is immersed in solution.

The invention also consists in apparatus for the manufacture of filaments or the like of cel-

lulose or cellulose derivatives, including a disc with an engraved or patterned edge.

The invention also consists in a process for the manufacture of filaments or the like of cellulose or cellulose derivatives, substantially as described.

The invention also consists in apparatus for the manufacture of filaments or the like of cellulose or cellulose derivatives, substantially as described with reference to the accompanying drawings.

The invention will now be described by way of example with reference to the accompanying drawings, Figures 1 and 2 of which show respectively elevation and plan of a suitable apparatus and Figures 3 and 4 of which show diagrammatically another method according to the invention.

A disc 1 of any required diameter is adapted to rotate on a spindle 2 bearing this disc, having preferably a fine knife edge, although depending upon circumstances, any other cross-sectional form of edge may be used.

The lower edge of the disc runs in a bath 3 of coagulant. Solution is applied to the disc by means of a roller 4 running in a bath 5 of solution, which the roller takes up and, after the thickness of solution has been regulated by the doctor roller 6, transfers it to the disc 1. After coagulation, the thread or the like is withdrawn from the disc 1 and passes over the wheel 7. The roller 4 may be adjusted in relation to the disc 1 by the adjustment wheel 8, and the doctor roller may be adjusted by the adjustments 9.

Instead of a supply roller any known and suitable method such as dipping or the like may be used, so that a line of the required width and thickness of viscose, acetate or other cellulose solution which has the required degree of viscosity usual in artificial silk processes is applied.

The solution which is used may comprise any solution of cellulose hitherto known such as cuprammonium, cellulose acetate, nitro-cellulose, cellulose xanthate and the like or mixtures of two or more such solutions or of any of the said solutions and rubber latex or any other desired compounding ingredient, so that on drying, a finished thread is formed or which will be finished when brought into contact with suitable agents such as heat, chemicals or otherwise. Such a solution may be contained in a suitable bath through which the periphery of the disc is adapted to continuously run so that the knife edge formed thereon will be constantly supplied with the described layer and subsequently by the rotation of the disc, the layer on the edge thereof passes into a bath filled with a suitable coagulant

such as sulphuric acid or caustic soda of suitable strengths or filled with any other known and suitable mixture or solutions. The disc rotates into this coagulant so that preferably the bottom edge only just touches the surface of the liquid solution or the disc edge may be substantially immersed in the coagulant as deeply as required or suitable, whereupon the line or thread of viscose or the like is immediately brought into contact with the coagulant so that coagulation shall commence and the line or thread of solution will now become progressively firm and solid. The thread which is now in the course of coagulation is then led away from the disc either when it is in the coagulant or after it has left it and if desired may be pulled continuously to a suitable extent by means of a rotating drum.

The pulling or tension roller may run in the coagulant itself or it may be continuously provided with any suitable powder to prevent tackiness of the thread (powder will not however in general be necessary), whilst behind the pulling roller there may be a second roller running at any suitable speed which is either similar to the first drum or when stretching is desired faster. In the latter case it is found that silk fibres or the like may slip on the first roller unless they are taken round it twice with spacing thread guides in between. Between these two drums the thread may also be powdered if required. The first or second drum may also serve as a winding drum to be replaced by empty ones as soon as the old ones have had wound thereon a sufficient length of thread.

Although a method has been described which involves a tensioning of the thread arrangements may also be adopted which will leave the thread in exactly the same shape as it was when it was applied in an uncoagulated form on the edge of the disc and if such a thread is required, very little or no pull at all will be necessary to separate the coagulating thread from the edge of the disc.

When the thread has left the disc it is advisable to clean the edge of the latter which is now rotating again towards the point at which it will receive a new supply of solution, from any matter which is still adhering to the edge, which will be chiefly coagulant, as this coagulant might cause coagulation during a new supply of viscose, acetate, etc.

Such a cleaning it will be understood, may be effected in any suitable way by any known or suitable methods or contrivances.

Each disc will consequently produce a continuous thread and a series of discs may be employed so that a large number of continuous filaments or threads may be simultaneously manufactured and produced and where necessary two or more such filaments or threads thus produced may be twisted together in order to obtain a thread or yarn of the desired thickness.

Instead of a knife edge being given to the disc, any suitable form of edge in cross-section may be used such as an edge-like and continuous ribbon, but the actual procedure of applying the solution in a predetermined shape on to the edge and completing the process of coagulation in the presence of this edge still holding the solution, remains essentially the same, as also the subsequent processes of pulling the thread or leaving it in its practically original shape by exercising very little or no pull on it whilst it is being separated from the edge and then winding, powdering and so forth are continued. The

edge may be sharply engraved, and, with stretching of the thread, fibres down to one or two deniers may be produced, the disc edge may be wide and may be engraved in pattern form so as to produce patterned flat tape.

In the case of nitro-cellulose and cellulose acetate, coagulation may be arranged to take place by heat alone.

According to a modification in such manufacture, a continuous or a non-continuous wire is coated by suitable and known means with the solution and this coated wire carrying the predetermined quantity (in the right shape) of solution is brought into contact with a suitable coagulant, as above mentioned, either by means of immersion, spraying the coagulant on to the covered wire or by running it over a roller which is plain or curved and bears a film of coagulant. Upon contact with this coagulant, the coating or film of solution commences to coagulate and at the required point either during or after coagulation has occurred, the now fairly solid tube around the wire is divided or split and this split miniature tube is led away with or without tension for further treatment as above described. Coagulation may be arranged to take place, where suitable, by heat. The wire having served its purpose of carrying the solution is then led again towards the point where a new supply of solution can be deposited thereon and preferably before it receives the new charge, it is subjected to a suitable cleaning action so that the new charge will be applied upon a clean surface.

In Figure 3 an endless wire runs over rollers 21 and 22. Roller 22 is immersed with its lower part in a tank containing solution 23. The wire receives a coating of solution and has applied to it coagulant or precipitant by the roller 24 running in coagulant or precipitant 25. The coagulum is pulled off from the wire and splits. By means of the rollers 26 and 27 however, the split tube is stretched, with the result that it reaches the roller 27, on which it is wound up.

In Figure 4, 20 is the wire, 28 the coating of solution in process of forming itself, under the influence of the applied liquid 25 in Figure 3, into a firmer coagulum, and 29 is the split or torn tube of coagulum as it is pulled off the wire.

In the case of heat-coagulation or precipitation, instead of the disc 25, a heating chamber is used.

In a modification, instead of the disc first receiving a charge of solution and then dipping into a coagulating bath, the converse process may be used, that is to say, the disc first receives a thread of coagulating liquid and this thread is then dipped into a solution such as viscose, acetate or the like to thereby become coagulated and form the desired thread or filament.

By the foregoing, it will be understood that threads or filaments or straw for forming an artificial silk fabric, cloth or lace may be quickly and easily produced, such threads being of any desired size and thickness and subjected where necessary to a stretching action to obtain the dimensions required. Continuity of the produced thread is ensured as there is no nozzle or spinneret used by which clogging might interfere with the desired continuity of supply.

I claim:

1. The process of manufacturing artificial filaments which consists in continuously applying a cellulosic solution to a moving line edge, dipping the moving line edge supporting the applied cellulosic solution into a coagulant, and simul-

taneously withdrawing the incompletely coagulated filament from the line edge support and stretching the filament.

2. The process of manufacturing artificial filaments which consists in continuously applying a cellulosic solution to a moving line edge, dipping the moving line edge supporting the applied cellulosic solution into a coagulant, simultaneously withdrawing the incompletely coagulated filament from the line edge support and stretching the filament, and applying coagulant to the stretched filament to complete coagulation.

3. The process of manufacturing artificial filaments which consists in continuously applying a cellulosic solution to a rotating knife edge, dip-

ping the knife edge supporting the applied cellulosic solution into a coagulant, and simultaneously withdrawing the incompletely coagulated filament from the knife edge support and stretching the filament.

4. The process of manufacturing artificial filaments which consists in continuously applying a cellulosic solution to a rotating knife edge, dipping the knife edge supporting the applied cellulosic solution into a coagulant, simultaneously withdrawing the incompletely coagulated filament from the knife edge support and stretching the filament, and applying coagulant to the stretched filament to complete coagulation.

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