April 26, 1938. H. P. VERSCHRAGEN 2,115,403

REPAIRING SPINNERETS

Filed Oct. 27, 1936

Fig. 1.

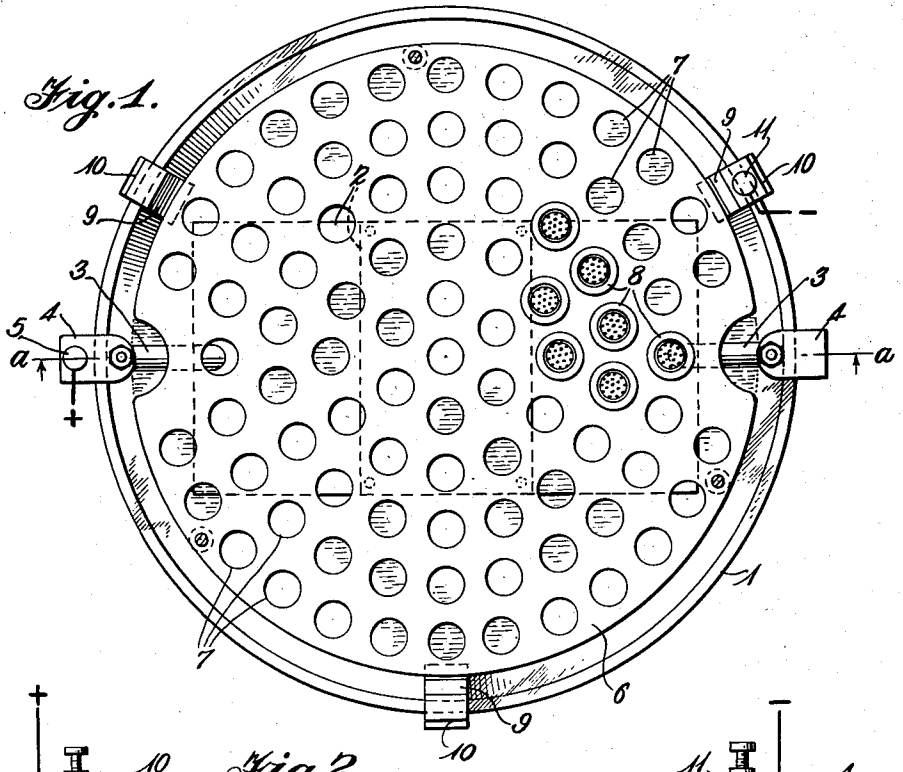


Fig. 2.

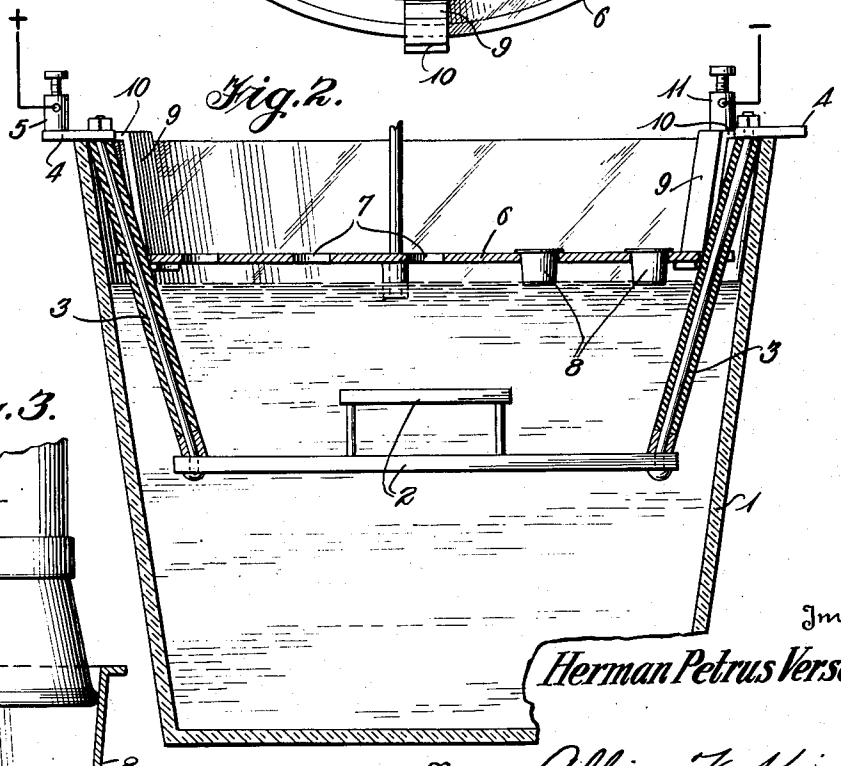


Fig. 3.

Inventor

Herman Petrus Verschragen

By Albin F. Knight

Attorney

Patented Apr. 26, 1938

2,115,403

UNITED STATES PATENT OFFICE

2,115,403

REPAIRING SPINNERETS

Herman Petrus Verschragen, Arnhem, Netherlands, assignor to American Enka Corporation, Enka, N. C., a corporation of Delaware

Application October 27, 1936, Serial No. 107,879
In Germany March 19, 1936

2 Claims. (Cl. 204—1)

This invention relates to repairing spinnerets employed in the manufacture of artificial silk, and more particularly to a method of protecting the sharp edges surrounding the minute orifices in the spinneret during the repairing steps.

The type of spinneret with which this invention is particularly concerned is a small, cup-shaped die having a base plate perforated with minute orifices through which a cellulosic spinning solution is extruded into a coagulating bath to form filaments. These spinnerets must be constructed of materials which will withstand the severe conditions to which they are normally subjected during the spinning operations. For practical working conditions, spinnerets formed of precious metals such as gold and platinum or their alloys are employed to the best advantage. These metals are substantially non-oxidizable, resistant to chemical action, and sufficiently durable to permit use over long periods of time without frequent replacement.

Although these precious metal spinnerets are the most suitable for the manufacture of artificial silk, they at times, do become damaged due to use over prolonged periods. During the spinning operation, incrustations form around the edges of the orifices thereby decreasing the diameters or often entirely closing the minute openings. This necessitates the removal and replacement of the clogged spinnerets. Moreover, the continuous use of the spinnerets in the spinning operation causes a wearing down of the edges of the openings and distorted places to occur in the bases.

The spinnerets which become impaired through usage were for the most part returned to the manufacturer to be melted and reworked into new spinnerets. This seemed to be a necessary expense, as in order to recondition the defective spinnerets, a successful polishing of the faces of the spinnerets had to be effected. However, the polishing action itself tended to damage the sharp edges of the orifices, which edges were already defective as a result of wear and corrosion, thereby increasing the objectionable results.

It is therefore the object of the present invention to overcome these difficulties by providing a method of depositing a layer of a base metal, for example, nickel, upon the face of the spinneret and upon the inner walls of the minute orifices, whereby the sharp edges of the orifices are protected from the action of the polishing agent until the damaged portions have been removed.

Additional objects will be apparent from the following detailed description when considered in connection with the accompanying drawing wherein—

Figure 1 is a top plan view of a galvanizing apparatus;

Figure 2 is a cross section taken on line *a—a* of Figure 1, and

Figure 3 is an enlarged detailed view illustrating a modified method of removing air bubbles from the openings in the spinnerets.

Referring to the drawing, numeral 1 designates a glass vessel containing a galvanizing solution of nickel sulphate. A nickel plate 2, acting as the anode of an electroplating assembly, is submerged within the tank and suspended in the solution by means of a pair of insulated arms 3. The upper ends of the arms are attached to the plates 4 located on the rim of the tank. One of these arms is provided with a post 5 for connection to the positive pole of an electric battery (not shown) or some other source of electric power.

A perforated nickel sheet 6 is also disposed within the tank and acts as the cathode. The disposition of this sheet is such that it is normally suspended adjacent to the surface of the electro-plating solution and preferably a small distance above the solution. The perforations or openings 7 within the sheet 6 are adapted to support individual spinnerets 8. These spinnerets are inverted so that their bases are below the surface of the electro-plating solution. A plurality of rods 9 are bent at their lower ends to support the nickel sheet 6 and at their upper ends have hooks 10 adapted to engage the rim of the tank. The negative post 11 may be located on any one of the rods and connected to the electro-plating assembly.

In conducting the process the spinnerets are first thoroughly cleaned in a bichromate sulphuric acid bath, rinsed with clean water and thereafter positioned within the openings of the nickel sheet acting as the cathode. The height of the electro-plating solution is such that the spinnerets are partially submerged within the solution. The current is then turned on whereby the bases of the spinnerets and the walls of the orifices therein are electro-plated with nickel. In order to insure that all of the orifices will be completely filled with the electro-plating solution, rubber tubes 12 or the like as indicated in Figure 3 may be fitted into the spinnerets and the solution drawn therethrough by means of suction. This application of suction to the spinnerets also functions to withdraw minute air bubbles which are present within the orifices

and which would otherwise inhibit the free circulation of the electro-plating solution. To further guarantee the removal of the air bubbles the nickel sheet may be removed at intervals and thoroughly shaken.

The electro-plating operation is continued until a layer of metal has been deposited to the extent of from 10 to 15 mu. After the completion of the electro-plating, the spinnerets are removed and polished until the damaged portions have been removed. It may be necessary to continue such polishing until substantially all of the plated metal is removed. The layer of metal prevents injury to the sharp edges of the orifices. The layer of metal retained within the orifices may be easily removed by acid treatment such as dipping the spinnerets in a strong nitric acid bath at approximately 80° C.

It is to be understood that modifications may be made in the process without departing from the spirit and scope of the invention. For instance, a number of different metals may be employed for electro-deposition on the face of the spinnerets and in such cases other metals would be more suitable for the cathode and the anode.

What I claim is:

1. A method of reconditioning spinnerets employed in the manufacture of artificial silk which comprises partially submerging each of a plurality of spinnerets in an electrolyte and electroplating a layer of metal on the bases thereof and around the walls of the orifices in the bases to thereby protect the sharp edges surrounding the orifices during future polishing, polishing and grinding the said bases to remove the damaged portions and substantially all of the base coating therewith while maintaining the edges of the orifices intact, and finally removing the metal coating remaining in the orifices with a solution of nitric acid.

2. A method of repairing spinnerets employed in the manufacture of artificial silk which comprises coating the surface of the spinnerets and the walls of the orifices therein with a layer of metal by electrolysis to protect the sharp edges surrounding the orifices, increasing the penetration of the electro-plating solution into the orifices by subjecting the spinnerets to suction, polishing the faces of the spinnerets to eliminate damaged portions and thereafter removing the remaining metal coating by subjecting the spinnerets to the action of an acid bath.

HERMAN PETRUS VERSCHRAGEN.