

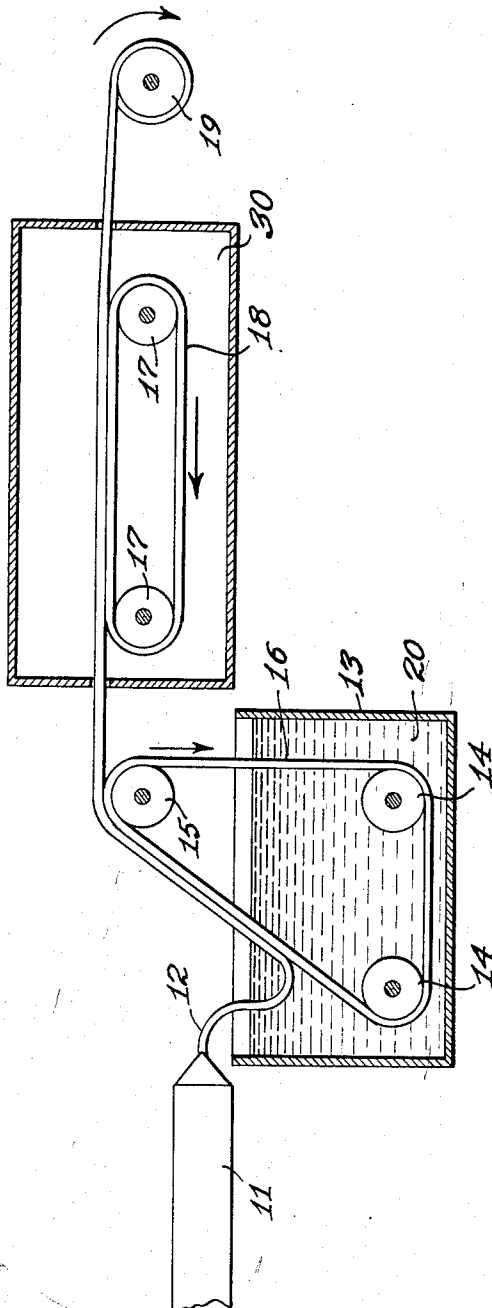
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METHOD OF PRODUCING ARTIFICIAL FIBERS FROM PROTEINS

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METHOD OF PRODUCING ARTIFICIAL
FIBERS FROM PROTEINS

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4 Claims. (Cl. 18—54)

This invention relates to methods of producing artificial fibers from proteins. It is specifically directed to a method of producing fibers from zein.

Zein is the alcohol soluble protein of corn and may be obtained commercially in the form of a powder. It can be cured with formaldehyde like other proteins. However the formaldehyde has a solvating as well as a curing action on the zein. For this reason it is not possible to extrude zein filaments from either alkaline or alcohol solutions of zein, or from zein in the form of a plastic dough, into a formaldehyde solution, for the purpose of precipitation and curing, because the filaments in such case would be tacky and adhere to each other because of contact before becoming hard, tough and horny.

It is therefore an object of the present invention to provide a highly improved process of the character described, including the step of mixing with the formaldehyde, a porous inorganic matter to form a slurry through which the extruded zein filaments are passed. The presence of the porous inorganic matter while permitting penetration of the formaldehyde, causes a fine coating to be formed on the threads and prevents tackiness so that the threads will not adhere to each other when wound up, thus making it possible to produce artificial fibers of zein by curing the same with formaldehyde.

Yet a further object of this invention is to provide a simple and economical process of the character described, which shall be highly efficient and easy to carry out.

Other objects of my invention will hereinafter appear in the following specification and the novel features thereof will be particularly pointed out in the appended claims.

In accordance with the present invention, extruded zein filaments are passed into a formaldehyde solution mixed with a porous inorganic matter such as kieselguhr which is an infusorial or diatomaceous earth or ground charred bone. The kieselguhr forms a fine coating on the threads and prevents tackiness.

The single figure of the drawing is a diagrammatic view of apparatus to carry out the invention.

The method of carrying out the process is as follows:

Commercial zein in powder form is dissolved in 90% ethyl, methyl or isopropyl alcohol, in the proportion of one part zein to three parts of the alcohol. The mixing is carried out at room temperature, and the product may then be extruded

through fine orifices to produce threads. The threads are passed from the orifices through an air space to allow most of the solvent to evaporate and the thread is then passed into a solution or slurry of about 40% by volume of formaldehyde containing about 25% by weight of kieselguhr.

The threads are then passed out of the slurry and through a drying chamber, preferably below 200 degrees F. The threads are preferably in the drying chamber from several seconds to several minutes.

The formaldehyde converts the zein from soluble, brittle substance into an insoluble and tough, horny form (insoluble in water alcohol or soap), and the kieselguhr does not allow the threads to become tacky before they harden. The kieselguhr in the slurry causes a fine coating to be formed on the threads and prevents tackiness. Nevertheless because the kieselguhr is porous, it permits the formaldehyde to penetrate the threads for the curing process. Ground charred bone may be used instead of kieselguhr.

The kieselguhr coating may be removed later if desired by immersing the threads in an alkaline solution such as sodium hypochloride.

The zein may be plasticized with the aid of water and a kneading machine at temperatures below 200 degrees F. instead of treating the zein with alcohol or an alkaline solution. The plasticized threads may then be extruded under pressure through fine orifices forming threads which are then passed into the formaldehyde kieselguhr slurry.

In the drawing there is illustrated apparatus for carrying out the invention. The drawing shows an extruder 11 of conventional form, from which there is extruded a filament 12 of zein. The apparatus further comprises a vessel 13 open at the top and disposed adjacent the extruder.

In vessel 13 are a pair of parallel rollers 14. Above the vessel 13 is another roller 15. Over the rollers 14, 15 is a belt 16. The rollers are rotated for moving the belt in the direction shown by the arrow in the drawing.

Adjacent the vessel 13 are a pair of horizontal aligned rollers 17 carrying a belt 18. The rollers are rotated for moving the belt in the direction shown by the arrow in the drawing.

The apparatus further comprises a winding-up reel 19. The zein filament or thread 12 extruded by the extruder 11 passes onto belt 16 as shown in the drawing.

In the vessel 13 is a slurry of formaldehyde and kieselguhr. The filament passes from the ex-

truder into the slurry 20 in the tank 13 and from there onto the belt 16.

The filament then passes onto belt 18 at which time it is dried.

It then passes onto the wind-up reel 19. The belt 18 may be depressed within a drying chamber 30.

It will thus be seen that I have provided a composition and method in which the several objects of this invention are achieved and which are adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth, is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A process of the character described, consisting in extruding zein through orifices forming threads, and passing the threads into a bath comprising formaldehyde and kieselguhr.

2. A process of the character described, consisting in extruding zein through orifices forming threads, and passing the threads into a bath comprising formaldehyde and kieselguhr, and thereafter immersing the threads in an alkaline solution.

3. A process of the character described, consisting in dissolving zein in alcohol, then extruding the dissolved zein through fine orifices to form threads, passing the threads through air and then passing the threads into a slurry of formaldehyde and kieselguhr.

4. A process of the character described, consisting in dissolving zein in alcohol, then extruding the dissolved zein through fine orifices to form threads, passing the threads through air and then passing the threads into a slurry of formaldehyde and kieselguhr, then passing the threads out of said slurry and into a drying chamber below 200 degrees F.

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