

ALIEN PROPERTY CUSTODIAN

TREATMENT OF WET SPUN PROTEIN PRODUCTS

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My invention relates to the treatment of products such as fibres, filaments, threads, films and the like, obtained by spinning protein solutions and more particularly casein solutions in spinning baths.

When spinning artificial fibres and threads it is generally known that the threads if spun without sufficient tension show a considerable shrinkage during fixing. If, however, for instance viscose threads are spun under a sufficient tension this fixation shrinkage is reduced within reasonable limits, for instance 5%, which is explained by the fact that the cellulose micels constituting the fibres on account of their oblong form allow themselves to be directed in the direction of the thread. If, however, fibres are spun from protein solutions, it appears that the directing by applying tension during the spinning process does not take place in such a simple way, which is presumably due to the properties of the highly swollen protein particles.

Therefore it is not at all surprising that when spinning protein solutions, for instance casein solutions, threads are obtained having a considerable fixation shrinkage, though it could not be expected that this shrinkage even may amount to 50 to 60% of the spinning length.

Besides that this shrinkage results into a fibre which is a hundred percent and more coarser than the fibre initially spun, the product obtained cannot be relied upon, because unknown influences may vary this shrinkage, so that a very irregular product is formed.

I have made many efforts to remove this drawback and particularly drew my attention to the application of tensions after spinning. In this way I mostly had to be satisfied when obtaining shrinkage values of 30 to 40%. I have now found an economically realisable possibility for reducing this disadvantageous shrinkage to values below 20% and even below 10%.

The process of my invention consists herein that the product, such as fibres or threads obtained by spinning protein solutions for instance casein solutions in a spinning bath, is treated with steam or water vapour after leaving the spinning bath. If desired the steam or water vapour may be mixed with other vaporious or gaseous substances, such as for instance ammonia, formaline, sulphur dioxide, alcohol, carbonic acid, which substances may have an entirely other action, for instance a hardening action on the threads, than the steam or water vapour.

The most simple way of putting the process of my invention into praxis is to subject the threads still in highly swollen condition to the action of steam or water vapour, for instance on their way to the cutting device or the spooling device, or on the spooling device itself while the

thread is still under some tension. Moreover it is also possible to carry out the treatment with the threads being on profiled rollers or the like and in this way the fibres may be fixed in a curled condition.

In my invented process it is not necessary to obtain a high temperature by means of the water vapour since the favorable action already is effected at approximately 40°C, i.e. a temperature at which it may be assumed that condensation takes place on the thread or fibre.

Obviously the action of the steam or water vapour may be obtained by directing the steam jet to the thread or fibre, but also the thread or fibre may pass a room in which a damp more or less warm atmosphere prevails, which is preferably obtained by blowing in steam. The spooling devices or the like may be arranged, if desired, in this moist chamber.

A further advantage obtained by the process of my invention consists herein that also the mechanical properties of the products obtained by wet spinning protein solutions are highly improved by the treatment of my invention. For instance casein threads not being treated with steam have a shrinkage of 30 to 60%, depending on the spinning method applied, whereas treated with steam but maintaining for the rest the same conditions, these threads may have a shrinkage of 6 to 12%. If after hardening in formaline baths and drying the strength of these threads is determined it appears that in the first case the strength amounts to approximately 45 to 60 and in the second case to 70 and more.

By my invention not only an extremely important improvement of spun protein products is obtained, but I succeeded in an amazingly simple way to give the products more normal properties.

My invention is applicable to the spinning of solutions of casein and other animal or vegetable proteins suitable or rendered suitable to this effect, such as for instance soya proteins, fish proteins, mixtures of these proteins and also to mixtures of these proteins with each other and/or with viscose. This spinning takes place in the usual way, i.e. a solution of the protein, generally in an aqueous solution of an alkaline substance, e.g. sodium hydroxide is spun in an acid spinning bath, e.g. an aqueous bath of mineral or organic acids and if desired salts. Obviously my process is not restricted to the treatment of fibres or threads, but it is also applicable to other articles of manufacture, for instance films and moreover my process is not restricted to the above given examples but also other suitable methods of treatment with steam or vapour come within the scope of my invention as will be obvious to the expert.