

# UNITED STATES PATENT OFFICE.

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## PROCESS FOR IMPROVING ARTIFICIAL FIBROUS MATERIALS.

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This invention relates to a process for improving artificial fibres, consisting of, or containing, cellulose or cellulose hydrate, such as viscose silk, cuprammonium silk, denitrated nitrocellulose silk or the like, or for improving materials consisting of, or containing, such artificial fibres.

According to the invention, such artificial fibrous materials are improved in respect of their strength by treating them with a solution of a caustic alkali containing not more than 5 per cent by weight of alkali metal hydroxide (calculated as NaOH) and stretching the material during at least a part of the treatment.

The invention is applicable to the artificial fibres in the form of spun material (threads, yarn in skeins or cops, or in the form of warps, twisted yarn or the like), or in the form of woven material, and is furthermore applicable to spun or woven material consisting purely of the said artificial fibres, or to spun or woven material containing in addition to artificial fibres, other fibrous material, such as cotton, silk, wool or the like.

The artificial fibrous materials may be treated with the solution of the caustic alkali in various ways; for instance, the artificial fibres, or the materials containing them, may be passed through the said solution, or they may be sprayed with the solution, or passed over rollers in contact with the solution, or they may be treated with the solution by impregnation, calendering, coating, painting, or the like, in short, by any known method of impregnating, coating, immersing, painting or the like.

It is essential to stretch the artificial fibres, or the materials consisting of, or containing, them, during at least a part of the process, for example, during the impregnation.

Especially good results are obtainable with very dilute solutions of alkali metal hydroxides, for instance, solutions of less than 1 per cent strength, for example of 0.2 to 0.5 per cent strength.

The material which has been treated according to the invention may finally be steamed or heated.

By the process according to the invention, it is possible to increase the strength of the artificial fibrous material by 30-100 per cent and over.

The following examples illustrate the invention:—

*Example 1.*—Viscose silk, cuprammonium silk, or denitrated nitro-silk is passed through a solution of caustic soda of 0.2-0.3 per cent strength, whilst stretching the material, and is then dried (for instance by passage through a chamber heated by steam) and wound. The impregnated silk is then washed, or it is first treated with a solution of a salt (for example, common salt, ammonium sulphate or the like), or with a solution of an acid (for instance, sulphuric acid of 10 per cent strength, or the like), and then washed and dried.

The final product may then be steamed.

*Example 2.*—The procedure is as in Example 1, with the exception that the artificial silk which has been treated with the dilute caustic soda solution is washed directly after the impregnation, or is treated with an acid, a salt, or the like, and then washed and dried.

The expression "artificial fibrous material" in the description and claims includes, whenever the context permits, all artificial fibres (such as artificial silk, artificial cotton, artificial hair and the like) consisting of, or containing, cellulose or cellulose hydrate, such as the artificial fibres from viscose or from a solution of cellulose in an ammoniacal copper solution, or denitrated fibres from nitrocellulose, in the form of spun material (threads, yarn in skeins or cops, or in the form of warps, twisted yarn, or the like), or woven material, and includes spun or woven material consisting purely of artificial fibres, and spun or woven material containing in addition to artificial fibres, other fibres, for example cotton, silk, wool or the like.

I claim:

1. Process for improving artificial fibrous materials consisting of, or containing, cellulose or cellulose hydrate, which comprises treating the material with a solution of a caustic alkali containing not more than 5 per cent by weight of alkali metal hydroxide (calculated as NaOH) and stretching the material during at least a part of the treatment.

2. Process for improving artificial fibrous materials consisting of, or containing, cel-

lulose or cellulose hydrate, which comprises treating the material with a solution of a caustic alkali containing less than 1 per cent by weight of alkali metal hydroxide (calculated as NaOH) and stretching the material during at least a part of the treatment.

3. Process for improving artificial fibrous materials consisting of, or containing, cellulose or cellulose hydrate, which comprises treating the material with a solution of a caustic alkali containing not more than 5 per cent by weight of alkali metal hydroxide (calculated as NaOH) and stretching the material during at least a part of the treatment and finally steaming the material.

4. Process for improving artificial fibrous materials consisting of, or containing, cellulose or cellulose hydrate, which comprises treating the material with a solution of a caustic alkali containing less than 1 per cent by weight of alkali metal hydroxide (calculated on NaOH) and stretching the material during at least a part of the treatment and finally steaming the material.

5. The process of improving artificial fibrous materials consisting of, or containing, cellulose or cellulose hydrate which comprises treating the material with a solution of sodium hydroxide containing not more than 5 per cent sodium hydroxide by weight

and stretching the material during a part of the treatment.

6. The process of improving artificial fibrous materials consisting of, or containing, cellulose or cellulose hydrate which comprises treating the material with a solution containing less than 1 per cent by weight of sodium hydroxide and stretching the material during at least a part of the treatment.

7. The process of improving artificial fibrous materials consisting of, or containing, cellulose or cellulose hydrate which comprises treating the material with a solution containing not more than 5 per cent by weight of sodium hydroxide, stretching the material during at least a part of said aforementioned treatment and thereafter drying the said material.

8. The process of improving artificial fibrous materials consisting of, or containing, cellulose or cellulose hydrate which comprises treating the material with a solution containing not more than 1 per cent by weight of sodium hydroxide, stretching the material during at least a part of said treatment and thereafter washing and drying the said material.

In testimony whereof I affix my signature.

LEON LILIENFELD.