

ALIEN PROPERTY CUSTODIAN

PRODUCTION OF ARTIFICIAL LEATHER

Carl Ludwig Nottebohm, Weinheim/Baden, Germany; vested in the Alien Property Custodian

No Drawing. Application filed November 24, 1939

This invention concerns a process for the production of artificial leather.

It is already known to produce artificial leather by impregnating fibre fleeces, such as are produced for example by carding, with binding agents. The transport and the handling of the fibre fleeces before the impregnation is very difficult as the fibre fleeces are very loose and tender and may easily be damaged in their structure. Such damaged fibre fleeces yield non-uniform products. The impregnation itself becomes difficult as well, especially if impregnation rollers with a higher pressure are used, because the binding agent will penetrate the loose fibre fleeces and thus will cause the fibres to stick to the rollers which are soiled by the binding agent. This again will damage the surface of the fleeces.

When impregnating in a bath one had to shift by leading the fibre fleeces between metal wire nets or sieves. This method, however, does not suit roller impregnation. Neither was it possible to avoid the shown disadvantages by felting the fibrous masses considerably before the impregnation. Hereby a sufficient coherence is produced but the qualities of the artificial leather suffers, as the considerably felted fibrous masses were more difficult and less uniform to impregnate than the loose fibre fleeces.

It has now been found that the shown disadvantages can be avoided by swelling the fibres of the fleeces' surfaces before the impregnation with binding agents by a treatment with solving or swelling agents. Hereby the fibres of the surface are joined so tightly that a resistant layer is obtained which coats the fleece on one side or on both sides somehow like a wide net and thus protects the fleece from mechanical damages and prevents the fibres from sticking to the surface of the rollers.

In carrying out the invention fibre fleeces are employed which were produced from natural or artificial fibres of vegetable or animal origin, for example hemp, flax, cotton, jute, rami, bast fibres, wood fibres, hair, skins or leather fibres, wool, silk, regenerated cellulose, staple fibre, fibres of cellulose esters or ethers and such like. Before being worked up the fibres may be subjected to various known treatments, for example they may be disintegrated by boiling, treated with oxidising or reducing agents or impregnated with wetting agents or mercerised. The fibres, if desired pre-treated, are then passed through a carding machine or like apparatus and are thus

worked up into a coherent fleece of more or less considerably felted fibres.

The fleeces thus obtained are now treated with solving or swelling agents for the superficial fibres. Only such amounts of these agents are used which will cause a considerable swelling of the superficial fibres or will bring them to the point of dissolving, which has the effect of an intimate assembly of the fibres.

The solving and swelling agents naturally must be adapted to the nature of the fibre from which the fleeces are obtained. Proceeding from fleeces obtained from vegetable fibres, such as hemp, flax, cotton, jute or rami, primarily a solution of copper oxyde in ammonia is used. The swelling of these vegetable fibres is facilitated by a treatment, by which the fibres are made sensible towards the swelling action, for example by mercerising. During this treatment a splitting up of the micelles and consequently a diminution of the molecules takes place. Fleeces of artificial fibres from regenerated cellulose, for example artificial silk or staple fibre, regenerated from a solution of copper oxyde in ammonia or from viscose solution may be swollen by alkali hydroxyde, for example sodium hydroxyde. Fleeces produced from cellulose, regenerated from nitro cellulose also may be swollen by organic solvents, like acetic esters or acetone. If the fleeces originate from fibres from cellulose esters, for example cellulose acetate or cellulose formate, generally alkali hydroxyde may be used as a solvent. Furthermore organic solvents, such as acetic ester, acetone, formic acid, pyridine, formamid may be used. Also for the purpose of swelling fibres from cellulose ethers, for example methyl cellulose, organic solvents, such as formic acid, ethyl alcohol, benzine and benzenes may be used. Fibres from water soluble cellulose ethers also may be swollen with water.

Albumen containing fibres, such as wool, skin or leather fibre or casein wool may be swollen with alkali lye. Natural silk is swollen with copper oxyde solved in ammonia. Fibres which are produced from skin by swelling and tearing out, such as are described in French Patent No. 764,642 already may be swollen under the influence of hot water or steam.

After this pre-treatment the fleeces may be dried although the drying is unnecessary, as the fibre fleeces as a rule are not impregnated immediately after the pre-treatment, but are at first rolled up, the solvents evaporating at the same time without difficulty. They are, of

course, regenerated in an apparatus suitable for the purpose.

According to a special embodiment of the invention the superficial layers of the fleece are produced from fibres different from those used for the body of the fleece. For example the fleece may be produced from vegetable fibres, such as hemp, flax, cotton, jute or rami. During its production one side or both sides of the fleece are covered with a superficial layer of acetyl cellulose. The thickness of these superficial layers may be varied. A gauze-like layer, as it is taken from the comb of a carding machine does already suffice. The fibre fleeces thus produced are now treated with solvng or swelling agents for the superficial layers. This embodiment is advantageous in so far, as only the superficial layers of the fleeces are wetted by the solvng or swelling agents and thus form a protective layer for the fleece itself. According to this embodiment any fibres may be used for the production of the fleece whilst for the superficial layers, especially if they are thin, also more expensive fibres may be used, which are swollen or brought to the point of dissolving by small quantities of solvents or cheap solvents. Preferably artificial fibres, especially acetyl cellulose are used for the production of the superficial layers.

The fibre fleeces pre-treated according to the invention may easily be rolled up or of and transported, the union of the fibres remaining undisturbed. The impregnation of the fibre fleeces on one or on both sides may be effected between rollers or by immersion in baths. Fleeces which have been coated only on one side with a protective layer are impregnated on the unprotected side. It is of great advantage to impregnate two or more fleeces simultaneously by leading the fleeces between rollers and introducing binding agents between them. If one side protected fleeces are impregnated that way they are thus lead between the rollers that the protected sides face the rollers while the fleeces are

assembled with the other sides. The impregnation may be effected by one of the applicant's prior processes according to patents (U. S. Applications S. N. 192,893 and 202,136).

5 A great variety of binding agents may be used for impregnation. As natural binding agent rubber may be employed, as synthetic binding agent use is made of artificial phenol or urea resins, polymerisates of unsaturated organic compounds, in particular polyvinyl compounds, polyacryl compounds, polystyrenes and also rubber-like polymerisation products of unsaturated hydrocarbons. If desired, mixed polymerisation products, for example of vinyl chlorides with vinyl esters or other polymerisable substances, having an olefine double bond, for example unsaturated hydrocarbons are employed. A solution of the binding agent in organic solvents may be used. The best results are obtained by employing aqueous emulsions or suspensions, for example natural or artificial latices.

10 By the pre-treatment according to the invention the tearing and damaging of the fibre fleeces as well as the sticking of the fibres to the surface of the roller is avoided even at a high pressure of the rollers.

15 The further treatment of the impregnated products is effected in usual manner by aid of drying, pressing, calendering and dressing. It was found that the structure of the superficial layers obtained from fibres, which are soluble in the solvents of the lacquers, often is advantageous for the process of lacquering, during which a swelling of the superficial fibres is effected, whereby an intimate bond of the fibre is attained. The fibrous character of the surface of the impregnated products becomes more or less blurred in proportion to the degree of swelling. The swollen outer fibre layer may easily and intimately be joined with the inner layers by consecutive calendering. The obtained products excel in a smooth surface.

CARL LUDWIG NOTTEBOHM.