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# UNITED STATES PATENT OFFICE

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## PREPARATION OF ARTIFICIAL MASSES

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1 Claim. (Cl. 117—163)

This invention relates to manufacture of artificial leather adapted for use more particularly as, or as a foundation for, leather substitute or floor or wall covering.

The process provided by the present invention consists in impregnating a fleece of fibrous material, e. g. cellulose, with an aqueous fluid containing rubber, casein and oil-seed flour, and drying and vulcanising the product, a pressing operation also being carried out on the fleece at any stage subsequent to the impregnation step. In this way a product is obtained characterised by high toughness, tear resistance and pliability, which properties make it pre-eminently suitable for the said and other purposes. The flour acts as a filler and whilst it supplies oil to the product it does not impart any greasy feel to the latter. It also supplies the oil in a form which will not rapidly dry out, so that the product retains its suppleness.

The fluid employed for effecting the impregnation of the fleece in the process provided by the invention is prepared by simply mixing the necessary ingredients together in the presence of water. The ingredients may be used in any convenient form. For example, the rubber may be used in the form of an artificial or natural aqueous dispersion, e. g. latex. Casein may be conveniently used as skim milk, if desired acidified for example in natural way, but the dry commercial article may also be employed after previous dissolution. The oil-seed flour may be for example soya bean flour. The bath ingredients are thoroughly mixed up with sufficient water to form a fluid which is mobile enough to impregnate the fleece efficiently.

Other, optional, ingredients may also be added to the fluid. Thus it may contain a small quantity of a wetting agent in order to promote the uniform wetting and impregnation of the fleece. Any wetting agent may be used, e. g. one of the sulphonated compounds commonly used for the purpose in the textile industries. Pigments may also be incorporated in order to confer a desired colour on the product. Vulcanising agents, which may be accompanied, if desired, by vulcanising accelerators, must be present in the fluid, unless the product is vulcanised by a method in which such agents are supplied from the exterior. The fluid may also contain a colloid, e. g. gelatin, which, like the rubber, acts as a binder for the fibres of the fleece.

The fleece to be subjected to the impregnation operation may be one of any desired kind of fibre, including cellulose. The best results are obtained with fleeces of short fibres, e. g. fibres of round about 1 cm. long, such as from fibre waste. Owing to the fact that in the usual mode of producing fleeces the fibres are disposed in the longitudinal direction on the card, the resulting fleece shows a higher tensile strength in the longitudinal direction than in the transverse direction, and while such a fleece may be satisfactorily used in the process of the invention the final product obtained will likewise differ in tensile strength according to direction. For many purposes of use this strength inequality in the final product will be immaterial, but it may be obviated, with consequent improvement in the product, by preparing the fleece prior to the impregnation step so that the fibres thereof are disposed in directions which intersect the longitudinal direction of the fleece. This may be effected for instance when producing the fleece by setting the take-up members (which actually take up and remove the fibre layers from the card) into an oscillatory (to and fro) motion with respect to the width of the fleece during the removal of the latter. The fibres in the fleece are thereby arranged in various directions inclined with respect to the longitudinal direction of the fleece, whereby the tear resistance is equalised in the transverse and longitudinal directions.

If desired several layers of fleece may be superposed prior to the impregnation, e. g. by winding the fleece upon itself.

The impregnation operation may be carried out in any suitable manner, e. g. by spraying the fluid on to the fleece or by immersing the fleece into a bath of the fluid.

The thickness of the product being made may be controlled either by starting with a fleece which is prepared sufficiently thick in order to yield a product of the desired thickness straight away or else by combining several sheets of fleece which have previously been separately impregnated. In the latter case the moist impregnated sheets are applied to one another, e. g. rolled together; it is advisable not to apply pressure during this uniting operation, although a slight pressure may be applied if desired, the moist individual layers readily adhering together on just being brought into contact.

The wet impregnated fleece is very fragile. In order not to affect the structure of the fleece in adverse manner during the treatment, to permit mechanical operations, like pressing for example,

to be carried out thereon, and to enable the fleece to be safely drawn through the treatment bath, it is necessary to provide it with some support during the treatment, e. g. to sandwich it between endless belts of net-form. The fleece remains immersed in the bath sufficiently long for thorough impregnation to take place. If desired pressure may be applied to the fleece while it is travelling through the bath.

It is possible to impregnate a continuous fleece supported between nets by immersion or spraying and when impregnated to wind it upon itself in order to build up a required thickness; in this way perfectly uniform and thorough impregnation of the whole layer is ensured whatever its thickness may be.

The dry impregnated fleece is finally vulcanised in known manner, but before the vulcanisation (e. g. whilst the fleece is still wet, or is semi-dry, or is even dry) or during the vulcanisation the fleece is subjected to a pressing operation. By having suitable vulcanising agents incorporated in the bath the vulcanisation may be effected during the drying operation. The vulcanisation, however, as already mentioned above, may be effected in a separate operation, and if desired may be carried out by a process in which the necessary vulcanising agents are externally supplied.

If desired the impregnated fleece may be treated, before or after drying, with a tannin solution; the final product obtained then acquires a pronounced leather-like consistency, exhibiting extraordinary toughness and tear-resisting properties.

The material obtained by the process of this invention is pliable and soft, water-stable, compact, and, especially after treatment with tannin, of high tear-resistance; these properties are apparent even in the case of quite thin layers. The material forms a valuable substitute for leather, and can be worked just the same as leather; it may also with advantage be used as floor covering. It also forms a highly advantageous foundation for the production of artificial leather, linoleum and floor covering by the known methods of making these materials. The process also is a highly economical one, since it is capable of working up to a useful product short fibre refuse which simply represents waste.

The material obtained by the process of the invention may also be shaped into products by pressing in moulds, either whilst semi-moist or in the thoroughly dried state. In this way shaped pieces or articles of the most varied form may be prepared.

*Example*

A bath is prepared by thoroughly mixing together:

(*a*) 400 gms. of latex of 33% dry rubber content;

(*b*) A casein solution prepared by dissolving 40 gms. of casein in 1 litre of warm water (at about 60° C.) to which has been added about 6 cc. of ammonia solution;

(*c*) A suspension of 100 gms. of soya bean flour in about 250 cc. of water;

(*d*) About 5 gms. of a sulphonated oil as wetting agent;

(*e*) About 10 gms. of carbon black as pigment; and

(*f*) A small quantity, e. g. 3–4 gms. of a sulphur vulcanising paste, as marketed for vulcanising purposes. If desired 1 litre of skim milk may be used in place of (*b*).

A fleece of cotton fibre, about 3 mm. thick, is then passed through the bath at room temperature, the fleece remaining immersed in the fluid sufficiently long for thorough impregnation to take place. The impregnated product is then dried under pressure at a temperature suitable for bringing about vulcanisation with the sulphur vulcanisation paste which is used; this temperature will usually be about 60° C. It will be noted that the rubber content in the impregnating bath is greater than the content of soya bean flour.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

The process which comprises impregnating a fleece of cotton fiber with a bath comprising about 400 parts of latex, containing a dry rubber content of about 33%, about 1000 parts of an aqueous casein solution containing dissolved therein about 40 parts of casein and 6 parts of ammonia solution, about 250 parts of an aqueous suspension containing about 100 parts of soya bean flour, about 5 parts of sulfonated oil as a wetting agent and sufficient sulfur to act as vulcanizing agent, then drying the impregnated product at vulcanizing temperatures while applying pressure thereto for a time sufficient to effect vulcanization.

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