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PROCESS OF MANUFACTURING RECONSTITUTED COMPRESSED LEATHER AND PRODUCT OBTAINED THEREBY

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The present invention relates to a new industrial product, obtained by a process of manufacturing having as a base waste of leathers, tanned or untanned, waste of raw textiles, dyed or sized, and which, after having freed same from all foreign substances, allows their reconstitution as close as possible to their original texture.

This waste, after being duly formed in a homogeneous mass by means of a binding substance and of preserving materials are shaped in sheets of any dimensions and any thickness, such sheets being manufactured, coloured and finished, according to the use for which they are intended.

The aforesaid process consists in performing the following different successive operations:

(*a*) Crushing the fibres so that the latter are brought back to their elementary condition and in such a manner that they may be intermingled the one with the other and thus increase the final resistance;

(*b*) Detanning the leather substances so that they approach as close as possible their natural condition;

(*c*) Addition of ingredients and of binding substances so as to constitute the required compound;

(*d*) Addition to the mass of one or more preservation products;

(*e*) Drying, pressing and watting out;

(*f*) Colouring and finishing.

In order to practically perform such a process, it is firstly proceeded to the crushing operation in order to appropriate the scraps to their use. As it has been said hereabove, the crushing operation is characterized by the fact that it is performed in such a manner that the fibres become completely separated the one from the other, which will allow subsequently a more efficient distribution within the mixture, as also a more perfect mixing.

The leather waste, according to its having been treated with vegetable tannins or with mineral salts, is previously detanned. This detanning is the most important feature of the process as, with respect to leathers and textiles, it must be taken into consideration that each tanner and each manufacturer has his proper method of working, from which it results that, if the waste products would be left in their delivery condition, when being re-used, they might cause reactions during the work, owing to their difference of manufacture or preparation. It is thus indispensable to bring them back to a uniform and regular condition of use, which will be as close as possible to their natural condition.

The separated and detanned fibres are again united so as to reconstitute a new mass and according to such various and different waste products thus prepared being intended for a particular manufacture.

The preparation and the appropriation of the different products introduced into the mass, form the object of a previous manipulation convenient to the proposed use.

One of the main binding substances is pure latex, non-coagulated, only preserved in ammonia. The use of such product requires a previous preparation which consists in dissolving the outer layer of resin with which the molecule of latex is surrounded, the fluidity of such product as it is withdrawn from the tree not allowing its direct use. The outer layer of resin must be previously emulsified by means of a substance capable of making the latex fluid without eliminating its qualities of resistance and suppleness, while adding thereto a wetting agent which allows its perfect binding with the fibre.

For this purpose, sulphanilate of sodium is used among others with as a wetting agent sulphonated oils and resin soaps, which, while assisting the perfect impregnation of the latex within the fibres of leather or of textiles, nourishes the latter and imparts more elasticity thereto.

Among the sulphonated oils a serious selection is required. Castor oil is almost exclusively formed with one single fatty acid which, like oleic acid, contains a double compound and, what is characteristic, a hydroxide group within the molecule, but the oil by itself does not present high nourishing properties.

Fish oils, on the contrary, are formed with four or five different fatty acids which, for the main portion have very low saturation. Some of these acids present five double compounds; others four, three, etc. Fatty acids are found therein having 16 to 20 atoms of C in the molecule.

These different mixed materials, if they were left in the condition in which they have been delivered, would be capable of rapid decomposition and would not resist humidity or changes of temperature. It is thus necessary to preserve them and to make sure that they may be preserved during a considerable time.

The fibres of leather, even those tanned with chromium salt, would not resist a temperature higher than 90° C. if they would not have been previously detanned. A vulcanization is thus impossible.

The fibres of cotton, wool, single or in mixture, as long as no fibres of leather are mixed there-

with, will resist vulcanization, but this method of preparation requires particular apparatus, which may be obviated by using the process hereafter:

Indeed, according to the invention, this method of vulcanization is systematically replaced by the mixing within the mass of products having phenol or naphthol or their derivatives as a base. The object of these products is to impart a kind of vulcanization to the fibres, which permits them to be preserved unlimitedly. These products react in the same manner upon the latex. There is namely question of the derivatives from oxidation of the diphenols.

The bath for preparation is characterized by the following prescriptions:

Leather scraps tanned with vegetable extracts:

The scraps are soaked within a vat, preferably provided with mechanical agitators and containing sufficient water so that they may easily float. The temperature of the water must not be higher than 18° to 22° C. in summer, and 28° to 30° in winter. A higher temperature would have too strong an action upon the detanning, and a lack of surveyance would cause the transformation of the leather substance, which would constitute an irreparable drawback.

Detanning may be performed either by means of sodium carbonate or by means of sodium borate. To the sodium carbonate may be objected its violent action necessitating a continuous surveyance. The action of sodium borate is smoother and slower and the result obtained will only be better. Moreover, the use of sodium borate does not require a permanent surveyance and the bath may be left alone all the duration of the operation.

The proportions to be used are:

1° with sodium carbonate, 0.3 to 0.5% of the weight of the dry scraps, during 30 to 45 minutes;

2° with sodium borate, 0.6 to 0.8%, from 45 to 60 minutes.

The excess of alkalinity, if present, may be neutralized by passage within a diluted bath of sulphuric or formic acid; the latter is preferable owing to its complete evaporation during drying.

The scraps are afterwards washed in clear water, presed or dried in a turbine to expel the most possible water, and they are afterwards passed to the drying device.

The control of acidity is made during the operation, which may be shortened or extended according to the case.

When it is convenient to treat scraps which have been tanned with chromium salt, the operation of detanning is more delicate and requires more control and care.

If necessary, the scraps are degreased, they are washed, the dye is removed, they are cut up in small pieces or otherwise they are chopped.

They are afterwards soaked in an aqueous solution of a mineral acid, such as sulphuric or hydrochloric acid. The concentration of the said solution may not be sufficient for dissolving the substance of the skin. 5 to 10 grams of acid per liter constitute a good proportion to be used.

The leather is then left in the acid while agitating from time to time until it has been completely saturated. The temperature of the bath must not exceed 30° C.

The acid liquor is then decanted and the material is washed with water to remove the dissolved and soluble chromium compounds.

The washed waste products are mixed with water, after which they are neutralized by means of an alkali.

Finally, it is treated successively with small quantities of peroxide of sodium, until a sufficient quantity has been added to convert the remaining chromium compounds into chromates which are easily soluble in water.

At the end, the scraps are completely washed with water.

Thenceforth, the operation may be summarized as follows:

When peroxide of sodium is put into contact with an excess of water, sodium hydrate and oxygen are produced according to the formula:

$$Na_2O_2+H_2O=2NaOH+O.$$

The oxygen in the presence of sodium hydrate transforms the chromium oxide into sodium chromate according to the formula:

$$Cr_2O_3+4NaOH+O=2Na_2CrO_4$$

The paste is prepared in the following manner, after the fibres have been conveniently prepared, namely:

Leather, chromium or vegetable	1,830 kgr.
A solution of casein (dissolved with borax)	0,250 kgr.
Latex	2,500 kgr.
Hyposulphite of sodium	0,200 kgr.
Water	6,200 l.
Sulphonated oil	0,250 kgr.
Sulphur	0,050 kgr.
Terpene	0,150 kgr.
Zinc oxide	0,050 kgr.
Accelerator (commercial)	0,100 kgr.
Solution at 1% of phenol, naphthol or their derivatives	0,200 kgr.
Ammonia	0,220 kgr.
	12,000 l.

These substances are mixed with each other, so as to form a completely homogeneous paste. It is then spread by hand or mechanically, either upon a support of carded fibres forming part with the material, or upon a fabric of jute or like appropriate material and according to the thickness it is desired to obtain.

These products may be mixed or prepared in advance, their composition allowing to keep them in their pasty condition during a plurality of hours, even during a plurality of days, which clearly differentiates this preparation from many of the other processes, which require the immediate use or mixture of the prepared pastes.

The sheets are conveyed to the drying plant where they are left until they have exhausted 70 to 80% of their humidity. They are afterwards firmly compressed and left to dry completely.

They are then ready to be dyed and finished according to the purpose for which they are intended. The colouring may be superficial or impregnated within the mass. For the latter operation, vegetable dyes are mixed to the paste in determined quantities and according to the practice, however taking care to take into account the turning which alkalis contained in the mass would cause upon such dyes.

The coloration is finished by an application of alcohol prepared colours, to which a quantity of nitrocellulose dissolved in ether-alcohol is added. The object of this addition is to completely set the substance and to impart to the compressed leather or to the sheets a regularly unified surface. The sheets are afterwards calendered, impressed and finished.

According to it being desired to obtain more or less suppleness, the proportion of casein and hyposulphite solution is increased or reduced.

To increase the suppleness and the resistance to traction, namely in sheets intended for morocco-dressing or for articles which ought to keep a certain flexibility, carbonate of lime is added to the mass at the end of the mixing and in a convenient proportion. This quantity is variable according to the suppleness required but must not be higher than 5% of the total quantity.

I claim:

1. The process of manufacturing reconstituted compressed leather, comprising substantially in mixture, waste of leather, textile materials, binding products, preservation products, dyeing substances and the like, consisting substantially in performing the following successive operations: crushing the fibres so that the latter are brought back to their elementary condition and in such a manner that they may be intermingled the one with the other and thus increase the final resistance; detanning the leather substances so that they approach as close as possible their natural condition; addition of ingredients and of binding substances so as to constitute the required compound; addition to the mass of one or more preservation products; drying, pressing and wetting out; colouring and finishing.

2. The process of manufacturing reconstituted compressed leather in which, when the scraps of leather used have been tanned with chromium salt, the process of detanning is the following: the scraps are eventually degreased, washed, cleared from their colouring substances, cut in small pieces or chopped; the thus reduced scraps are soaked in an aqueous solution of a mineral acid, such as sulphuric or hydrochloric acid, in the proportion of 5 to 10 gr. of acid per liter; the scraps are left in a bath during a certain time and periodically agitated until complete saturation, the temperature of the bath normally not exceeding 30° C.; decanting the said liquid and washing the material with water to remove the dissolved and soluble chromium compounds; mixing the washed scrap with a certain quantity of water and neutralizing with an alkali; conversion of the remaining chromium compounds into chromates, for instance by means of small quantities of peroxide of sodium; and final washing of the scraps with water.

3. In the process of manufacturing reconstituted compressed leather, the step whereby the latex used as binding substance, previously to its introduction into the mass of treated scrap, is put in contact with a medium capable of making it fluid as also with a wetting medium, these substances being for instance respectively sulphanilate of sodium and duly selected sulphonated oils.

4. In the process of manufacturing reconstituted compressed leather, the step of producing a plastic mass comprising:

Leather, chromium or vegetable	1,830 kgr.
A solution of casein (dissolved with borax)	0,250 kgr.
Latex	2,500 kgr.
Hyposulphite of sodium	0,200 kgr.
Water	6,200 l.
Sulphonated oil	0,250 kgr.
Sulphur	0,050 kgr.
Terpene	0,150 kgr.
Zinc oxide	0,050 kgr.
Accelerator (commercial)	0,100 kgr.
Solution at 1% of phenol, naphthol or their derivatives	0,200 kgr.
Ammonia	0,220 kgr.
	12,000 l.

5. In the process of manufacturing reconstituted compressed leather, the step whereby the paste, comprising substantially the composition disclosed in claim 4 is manufactured, either for instance that it is spread by hand or mechanically upon a support of carded fibres forming part with the material, or upon a fabric of jute or other appropriate substance and according to the thickness it is desired to obtain, the sheets thus formed being brought in the drier and kept therein until they have exhausted 70 to 80% of their humidity, after which they are highly compressed and completely dried and finally submitted to the operations of ornamenting and finishing.

6. In the process of manufacturing reconstituted compressed leather, the step of performing the dyeing superficially or impregnated within the mass, in this latter modification the vegetable dyes, in determined quantity, being mixed to the paste, and the dyeing being finished by an application of alcohol dissolved colours, to which may be added a quantity of nitrocellulose dissolved in ether-alcohol, the object of this addition being to set completely the material and to impart to the compressed leather or to the sheets a regularly unified surface, said sheets being afterwards coloured, impressed and finished.

7. In the process of manufacturing reconstituted compressed leather, the step whereby the degree of suppleness of the product is determined by a variation in the proportion of the hyposulphite, and that the suppleness is increased by the addition, after the mixing, of a carbonate, for instance carbonate of lime, in a proportion of 5%.

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