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TREATMENT OF ARTIFICIAL LEATHER SHEETINGS AND PRODUCT OF SAME

Filed April 27, 1929

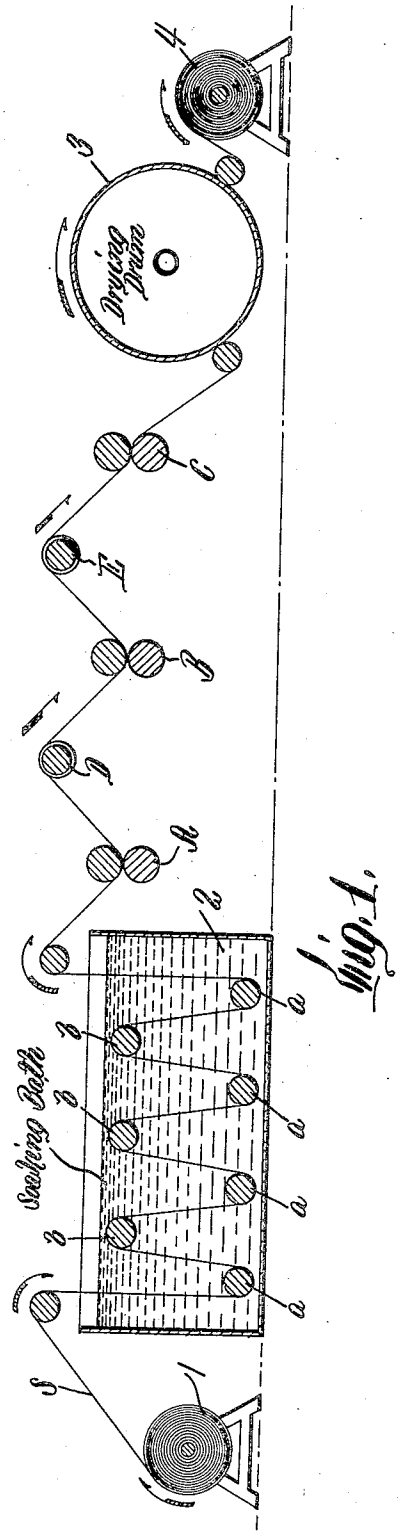


Fig. 1.

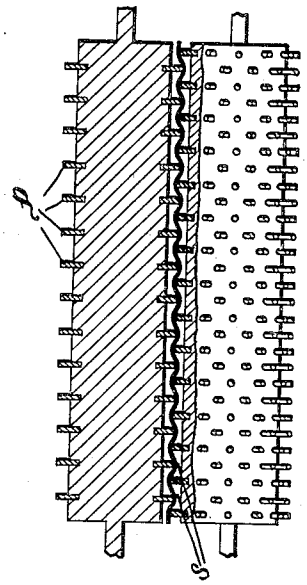


Fig. 3.

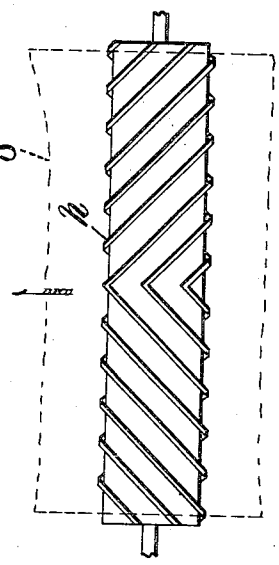


Fig. 2.

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UNITED STATES PATENT OFFICE

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TREATMENT OF ARTIFICIAL LEATHER SHEETINGS AND PRODUCT OF SAME

Application filed April 27, 1929. Serial No. 358,745.

In the manufacture of artificial leather sheetings, it is sometimes the practice to impregnate fibrous sheet material such as textile fabrics, felts, and papers with aqueous dispersions of rubber such as latex in natural or vulcanized condition or artificial dispersions of crude or reclaimed rubbers, and then to set or coagulate the rubber as by drying or treatment with a dilute acid, and, if desired, to vulcanize the impregnated product. When the fibrous sheet material is porous and made of cellulose fibers such as cotton or wood pulp interfelted on machinery of the paper-making type, it has been found capable of absorbing a comparatively large amount of dispersed rubber and that the impregnated and dried product has characteristics including strength, stretch, resistance to tear, water repelancy, pliability, and feel simulating those of natural leathers. The degree to which these characteristics are acquired by the product depends upon the particular conditions of its manufacture, but it has been found possible to produce artificial leather sheetings as described, eminently suitable for use as a substitute of the natural product in various fields.

Artificial leather sheetings of the type described, whether or not the rubber is vulcanized, are commonly characterized by a harsh and stiff feel, comparable to that sometimes possessed by the natural product. For some commercial uses, harshness and stiffness is decidedly disadvantageous, but the problem of doing away with these characteristics cannot be solved successfully, so far as we are aware, by modifying the characteristics of the rubber as by compounding therewith various softening or plasticizing agents such as oils or waxes, as, generally speaking, if a sufficient amount of such agents be used to cause a decided softening, the strength of the artificial leather sheeting is seriously impaired.

We have found that if artificial leather sheetings, such as hereinbefore described, are mechanically worked while wet, preferably by stretching, and then dried, they are made remarkably flexible or pliable and at the same time improved in strength, stretch and tear resistance. Such a treatment may be carried out successfully by wetting the sheeting with either cold or with hot water, to produce products which differ somewhat in their characteristics, the hot water wetting treatment, for instance, tending to give more flexible products but which have a distinctly rubbery feel. We have further found that the method described may be advantageously practiced where it is desired to incorporate water-soluble materials into the artificial leather sheeting. For instance, if it is desired to color the sheeting, a water-soluble dyestuff may be present in the wetting water, in which case dyeing and softening of the sheeting may be effected at the same time, mechanical working of the wet sheeting resulting in an even distribution of color through the product. We have still further found that for many purposes it is desirable to add a tanning agent to the wetting water, particularly when the method is carried out with hot water and the dispersed rubber used as a raw material in making the artificial leather sheeting is an unpurified rubber latex in the sense that it contains proteins, resins, and other non-rubber constituents associated with natural latex, as in such case the artificial leather sheeting may be somewhat tacky. The addition of 1% to 2% of a tanning agent, preferably a vegetable extract such as chestnut, oak, or quebracho, to the water results in a product with a dry feel, and it is believed that the product is improved in stability or resistance to ageing. While tanning agents of vegetable origin are preferable in that they not only impart color and odor characteristic of vegetable-tanned hides and skins to the product, substantially removing the characteristic rubber odor, but also modify the characteristics of the rubber in the sheeting so that an improvement in quality of product is realized. In lieu of vegetable tanning agents, it is possible to use alum or other inorganic tanning agents. The action of the tanning agents, it is believed, is to convert the albuminous materials in the sheeting to insoluble condition, so that they no longer are subject to putrefaction, or deterioration, by ageing. In conformity with this theory, it is found that if a sheet of interfelted fibers is impreg-

nated with a latex purified in the sense that proteins, resins, and other non-rubber constituents associated with natural latex have been removed therefrom, there is little or no advantage in the use of tanning agents during a softening treatment such as described except for their coloring effect.

Various types of apparatus may be used in carrying out the method hereinbefore described, it being preferable to use a type which effects stretching in all directions. For instance, we may use an apparatus designed to effect longitudinal and lateral stretching of the wet sheeting, or we may use one which effects longitudinal stretching and an additional local stretching.

On the accompanying drawing,

Figure 1 represents more or less diagrammatically and conventionally an apparatus for carrying out the method of the present invention.

Figure 2 is a plan view of a roll capable of effecting sidewise stretching of the sheeting when the latter is passed in tight contact therewith in the direction indicated.

Figure 3 is a front view, partly in section, of a pair of rolls designed to effect local stretching of the sheeting.

Referring to Figure 1 of the drawing, at 1 is shown a roll of sheeting S, which may comprise a base of interfelted cellulose fibers which has been impregnated with rubber, as by dipping in rubber latex and then drying. The sheeting S may be unwound from the roll 1 and passed into a bath of water 2, in which guide rolls arranged in a lower series *a* and an upper series *b*, may be maintained submerged, the sheeting passing alternately from a lower roll to an upper roll to furnish a large area of contact with the water, and thus to permit the sheeting to become thoroughly wetted and contain, say, from one-half to twice its own weight in water by the time it passes out from the bath. The water bath may be at room temperature, but, if desired, it may be hot. It may be desirable to add tanning agents or other water-soluble materials such as dyestuffs thereto. The water-soaked sheeting emerging from the bath may be passed through a series of pairs of rolls indicated at A, B, and C, these rolls preferably being covered with soft rubber so that gentle squeezing is effected when the sheeting passes therethrough. The rolls of each pair may be driven at the same peripheral speed in order to avoid rubbing action and bruising of the faces of the sheet, but the rolls B should be driven a little faster than the rolls A, and the rolls C a little faster than the rolls B, so as to effect longitudinal stretching of the sheeting throughout its body portion between the regions engaged by the successive pairs of rolls. Between the rolls A and B and B and C are preferably mounted rolls D and E having herringbone-ribbed surfaces *h*, so that as the tensioned sheet passes thereover in tight contact with the herringbone ribs and in the direction indicated in Figure 2, lateral stretching of the sheeting is effected. The rolls D and E need not be positively driven, their rotation being effected by frictional engagement with the wet sheeting. The stretched wet sheeting may then be passed over a dryer drum 3 and the dried sheeting wound on a roll 4 from which it may be taken for suitable finishing treatment. In lieu of using rolls as illustrated in Figure 1, successive pairs of rolls such as shown in Figure 3 may be used, each roll of a pair being provided with rows of spaced blunt pegs *p* projecting from its surface and cooperating with the spaces or recesses *s* between similar pegs on the other roll, so as to cause local stretching of the sheeting as it passes through the rolls. The successive pairs of rolls may be driven at progressively increasing peripheral speeds to effect longitudinal stretching as well as local stretching.

Our theory is that the mechanical working of sheetings such as described, while wet, after once having been dried, results in a physical change in the form of the rubber present therein. The amount of this working is far too small to be analogous to the "breaking down" produced on the rolls of a rubber mill. The best analogy seems to be the effect produced when a fresh coagulum of rubber is gently kneaded. For instance, it is well known that the addition of dilute acid to latex causes the precipitation of a very soft and flabby coherent curd. If this is worked between the fingers for a few minutes, it becomes tough, leathery, and elastic. It is possible that a similar action occurs when a wet rubber-impregnated sheet is gently worked as hereinbefore described.

The method of the invention and various ways in which it may be applied in practice having been thus described, it should be evident to those skilled in the art that various changes and modifications might be resorted to without departing from the spirit or scope of invention as defined in the appended claims.

What we claim is:—

1. A method which comprises wetting dry, rubber-impregnated, fibrous sheet material with water containing a water-soluble dyeing agent, mechanically working it while wet to soften the sheet and to distribute the agent uniformly therethrough, and again drying.

2. A method which comprises wetting dry, rubber-impregnated, fibrous sheet material with water containing a tanning agent, mechanically working it while wet to soften it and uniformly to distribute the tanning agent therethrough.

3. A method which comprises wetting throughout a continuous predried web of cellulose fibers impregnated with water-dis-

persed rubber of the character of latex, progressively engaging the web at spaced regions laterally thereof while subjecting it to stretching longitudinally throughout its body portion between said regions, and redrying the stretched web.

4. A method which comprises wetting throughout a predried continuous web of felted cellulose fibers impregnated with water-dispersed rubber of the character of latex; passing the wet web progressively through the nips of a series of pair of rotating rolls, the rolls of each pair of said series being rotated at the same peripheral speed but greater than that of a preceding pair, to effect a longitudinal stretching of the web throughout its body portion; and redrying the stretched web.

In testimony whereof we have affixed our signatures.

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