

# UNITED STATES PATENT OFFICE.

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## METHOD OF TREATING FABRIC.

1,344,645.

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No Drawing. Continuation of application Serial No. 22,786, filed April 21, 1915. This application filed December 27, 1916. Serial No. 139,197.

*To all whom it may concern:*

Be it known that I, ERWIN E. A. G. MEYER, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented certain new and useful Improvements in Methods of Treating Fabric, of which the following is a full, clear, and exact description.

This invention relates to the treatment of fabric to be friction-coated with rubber or the rubber compound.

One object of this invention is to prevent the breaking down of fabric which is constantly subjected to flexing by substantially eliminating friction between the contiguous fibers of the fabric.

A further object of this invention is to provide a more intimate union of the rubber frictioning and the fabric by producing therein so thorough a penetration and permeation of the interstices of the fabric by the rubber or rubber compound that the individual fibers forming the threads are substantially surrounded by and embedded in the rubber composition.

This application is a continuation of my application Serial No. 22,786 filed April 21, 1915.

I accomplish my objects by a preliminary treatment of the fabric, which consists in incorporating therewith a very highly dispersed lubricant evenly throughout its entire structure.

Various expedients have been tried to produce such a permeation, among them submerging the fabric in oil, and the application of a soap and water solution, but in no instance so far as I am aware, has any one succeeded in producing more than a comparatively superficial penetration.

Another serious objection to the lubrication of the fabric by immersing it in an oil bath is the fact that the oil thus applied tends to localize on the surface of the sheet, with the well known resultant deleterious action on the rubber stock. On the other hand it has been discovered that if oil or resin in small proportions is intimately associated with and evenly distributed through

rubber compound prior to its vulcanization, no harmful effect is produced.

My invention consists in lubricating the inside fiber or causing a capillary impregnation of the fabric by the even distribution of such a small amount of material as not to disturb its outside condition, and I accomplish this result by incorporating therewith minute globules of oil or other lubricant, preferably in diameter from  $\frac{1}{1000}$  to  $\frac{3}{1000}$  of a millimeter. I have found that only by the above extremely high dispersion can the desired impregnation be attained, and that the preferred method of producing such a minute dispersion is by the use of chemical substances which have the quality to create an extremely fine emulsion.

One chemical substance I have found to be very efficacious in producing the desired result is stearamid. However, I do not wish to limit myself to the use of stearamid as any substance capable of producing an emulsion of the requisite degree may be used without departure from the spirit of this invention, what I desire to protect being the use of an emulsion to lubricate the fiber of the fabric.

One emulsion which has given satisfactory results has been prepared as follows:—

7 grams neat's foot oil 20°, 7 grams paraffin wax 120°, 7 grams corn oil, in 2000 c. c. water impregnated at boiling point.

The above compound is combined with 5-25% of stearamid, based on the weight shown in the table of the above components, namely, neat's foot oil, paraffin wax and corn oil. The preferred quantity of stearamid in the above example is 10%. Stearamid is an amido-compound of stearic acid, and has the formula  $C_{17}H_{35}CONH_2$ .

For the lubricating material a great diversity of substances may be used, among them oils, gums, resins and waxes of vegetable, animal or mineral origin; or synthetic compounds of aromatic or paraffin nature; the only requisite being the capability of fine dispersion, either singly or compounded.

I have found that an efficient method of incorporating the emulsion into the meshes

of the fabric to be by submitting the material to be treated to a bath of hot water immediately prior to its being submerged in the emulsion bath. The fabric thus treated takes up the emulsion much more readily than without the preliminary treatment.

Having thoroughly saturated the fiber with the emulsion it is removed from the bath and placed in a suitable drying apparatus. Here the water is evaporated, leaving the fabric with minute globules of the lubricating material dispersed throughout the fibers and threads, but without having its superficial surface disturbed in any way. I then apply the rubber friction as with untreated fabric, but with the result that the material penetrates the interstices much more thoroughly and, in case several plies are superposed to build an article, they are united by the easier flowing rubber stock, which forms a continuous, uninterrupted and coherent network of rubber throughout the whole body of the built-up structure.

As above stated, any agent capable of producing an extremely high dispersion of the lubricant is suitable for use in forming the emulsion. In case the friction-coated fabric is to be used in the manufacture of automobile tires, or other articles embodying a plurality of plies of fabric, I have found that an emulsion produced by the use of stearamid is especially satisfactory, in that the small amount of the substance remaining in the fabric acts as an accelerating or catalytic agent in the vulcanization, thus greatly hastening the cure. It will be understood that other organic basic substances may be employed, particularly good results having been obtained by the use of substances having an amido group.

In case the frictioned sheets are vulcanized singly, however, the difference in time required for the cure without such an accelerating agent over that where one is used, is so slight as to be immaterial.

Experiment has shown that tires whose carcasses are of fabric treated as above described, are much less liable to rupture and blow-out than those built according to the usual practice, the fabric therein retaining its pliability and flexibility indefinitely without resultant separation of the concentric plies.

Having thus described my invention what I claim and desire to protect by Letters Patent is:—

1. The method of treating fibrous material which consists in subjecting same to an application of an emulsified lubricating material whereby said material is intimately associated with the fibrous material and thereafter applying to the fibrous material a coating of vulcanizable plastic.

2. The method of treating fibrous material which comprises applying a lubricating material thereto emulsified by an agent adapted to cause a capillary impregnation of the fibrous material by said lubricating material and applying a vulcanizable plastic to the so-treated fibrous material.

3. The method of treating fibrous material which consists in first impregnating the same with an emulsified lubricating material and subsequently applying a vulcanizable plastic.

4. The method of treating fibrous material which consists in subjecting same to an application of an emulsified lubricant, liquid under normal conditions, whereby said lubricant is intimately associated with the fibrous material and thereafter applying to the fibrous material a coating of vulcanizable plastic.

5. The method of treating fibrous material which consists in applying thereto a lubricating material emulsified by a basic emulsifying agent and applying a vulcanizable plastic to the so-treated fibrous material.

6. The method of treating fibrous material which consists in first impregnating the same with an emulsion of a lubricating material in a volatile carrying liquid, then evaporating off said volatile constituent of the emulsion, and finally applying a rubber compound.

7. The method of treating fibrous material which consists in first impregnating the same with an emulsion of a lubricant produced by stearamid and subsequently applying a vulcanizable plastic.

8. As an article of manufacture, a layer of fibrous material impregnated by a lubricant treated with a basic emulsifying agent capable of accelerating vulcanization.

9. As an article of manufacture, a layer of fibrous material, an emulsified lubricant impregnating said material, and a layer of rubber intimately associated with said fibrous layer.

10. As an article of manufacture, fabric having thinly dispersed lubricating material evenly distributed throughout its structure and a coating of rubber compound thereon.

11. As an article of manufacture, fabric, and a mixture of a lubricating material and stearamid, said lubricating material being evenly distributed throughout the fabric.

12. As an article of manufacture, a layer of fibrous material, an emulsified liquid impregnating said material for lubricating it and a layer of rubber intimately associated with said fibrous layer.

13. As an article of manufacture, fabric having the individual fibers of the threads evenly coated with lubricating material throughout its internal structure and a coating of rubber compound thereon.

14. As an article of manufacture, fabric, a mixture of lubricating material and stearamid evenly coating the threads of said fabric, and a layer of rubber superposed on said fabric. 5
15. The method of treating fibrous material which comprises subjecting the same to a bath of hot water, to facilitate impregnation, subjecting the material to the application of an emulsified lubricant and thereafter applying a vulcanizable plastic. 10
16. The method of treating fibrous material which consists in first subjecting the same to a bath of hot water and then impregnating the same with an emulsified lubricant material and subsequently applying a vulcanizable plastic. 15
17. The step in the treatment of fabric which consists in treating a substantially water insoluble lubricant with an amido-compound of an acid, forming an emulsion of the lubricant thereby, and impregnating the fibers of the fabric with said emulsion. 20
18. The step in the treatment of fabric which consists in treating an oil with an amido-compound of an acid, forming an emulsion of the oil thereby, and impregnating the fibers of the fabric with said oil emulsion. 25
19. The step in the treatment of fabric which consists in treating a substantially water insoluble lubricant with an amido-compound of a fatty acid, forming an emulsion of the lubricant thereby, and impregnating the fibers of the fabric with said emulsion. 30
20. The step in the treatment of fabric which consists in treating an oil with stearamid, forming an emulsion of the oil thereby, and impregnating the fibers of the fabric with said emulsion. 40
21. As an article of manufacture, a fabric impregnated by a substantially water insoluble lubricant, emulsified in the presence of an amido-compound of an acid. 45
22. As an article of manufacture, a fabric impregnated by an oil emulsified in the presence of an amido-compound of an acid. 50
23. As an article of manufacture, a fabric impregnated with an oil emulsified in the presence of stearamid. 50
24. A process for treating fibrous material which comprises treating the material with a heated aqueous medium and subjecting the so-treated fabric to a fine emulsion of a substantially water insoluble lubricant. 55
25. A process for treating fibrous material which comprises treating the fabric with a heated aqueous medium and subjecting the so-treated fabric to a fine emulsion of oil and water. 60
26. As an article of manufacture, a fabric impregnated with an oil emulsified in the presence of an amido-compound of a fatty acid. 65
27. As an article of manufacture, a fabric impregnated with an oil emulsified in the presence of an amido-compound of an acid. 65
- Signed at Detroit, county of Wayne, State of Michigan, this 23rd day of December, 1916. 70

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