

# UNITED STATES PATENT OFFICE.

ADOLPH SOMMER, OF BERKELEY, CALIFORNIA.

## WATER-PROOF LEATHER AND PROCESS OF MAKING THE SAME.

SPECIFICATION forming part of Letters Patent No. 408,360, dated August 6, 1889.

Application filed July 18, 1888. Serial No. 280,320. (Specimens.)

*To all whom it may concern:*

Be it known that I, ADOLPH SOMMER, a citizen of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented a new and useful Improvement in Waterproofing and Preserving Leather and Hides; and I do hereby declare that the following is an exact description of the invention, which will enable others skilled in the art to which it appertains to apply and execute the same.

I have found that the sulphochlorinated oils and fats possess a remarkably strong power of repelling water, and that this property is not only inherent in the completely-vulcanized oils, which, from their general semblance to india-rubber, would naturally be supposed to resemble that substance also in this respect, but that it is common to all sulphochlorinated fatty bodies, to the liquid as well as to the solid.

Some of the sulphochlorinated vegetable oils—namely, those prepared from the oils of castor-bean, linseed, cotton-seed—have already heretofore been mixed with either india-rubber or with dissolved collodion-cotton, and in this state externally applied to textile fabrics in order to produce a water-proof coating which would resemble and take the place of pure india-rubber; but none of these vegetable oils, and still less the sulphochlorinated animal oils or solid fats, have ever been employed for waterproofing or preserving leather nor in converting hide or skin into leather. For this purpose, however, I find these compounds particularly suitable, since, owing to their viscosity, they adhere so tenaciously to the particles which make up the body of the hide or leather that cold water, which, especially if aided by motion, readily displaces and removes the natural fats from leather is unable to displace and expel these compounds. This explains why leather which has been uniformly impregnated with these compounds never becomes hard and brittle after an exposure to wet, even if it contain of such compounds only as little as fifteen per cent. of its weight, while when the percentage reaches forty per cent. and over it becomes practically impermeable to water. The sulphochlorinated compounds which I usually employ for this purpose are the liquid preparations

made from vegetable or animal oils and the easily-liquefiable preparations made from solid fats and waxes; and, since the water-repelling property of these compounds is, within certain limits, the greater, the more chloride of sulphur has been employed in their preparation, I usually employ compounds in which more than ten, and most commonly such in which about fourteen parts of the chloride have been used to one hundred parts of the fatty body. These compounds may be used in the pure state or in combination with other substances—such as the natural oils or fats, rosin or other resinous bodies, rosin-oil, tar, paraffine, ozokerite, vaseline, coal-oil, benzine. When employed in the pure state, those preparations or mixtures of preparations are chosen which at the temperature at which the operation is performed remain fairly fluid, while, when the compounds are to be diluted with other substances, the more viscid preparations are preferred, because by dilution their viscosity is greatly decreased. The mode of applying these preparations depends mainly upon the nature of the article which is to be treated with them.

Finished leather, whether made by vegetable, mineral, or alum tannage, or by tawing, as well as articles made therefrom—such as boots, shoes, harness, belting—may be treated by any of the following methods:

The leather or manufactured article is thoroughly dried, and then the liquid or liquefied preparation applied to the flesh side, sometimes to both flesh and grain side of the leather, or to the outer surface of boots, shoes, and similar manufactured articles. After that the leather or article is hung up in a warm place where the temperature does not exceed 65° centigrade, and left there until the compound has been entirely absorbed. These operations are repeated until a sufficient quantity of the compound has been introduced.

When the leather or manufactured article is to be completely saturated with the compounds, I prefer to immerse the same into a warm bath of the preparations. The leather is left in the bath until nearly or completely saturated. If only partly saturated, it is hung up in a warm place to allow that portion of

the compound which adheres to the surface to yet enter the leather, after which, and also in the case of complete saturation in the bath, the surface is cleaned by scraping and finally  
5 by wiping it with cloths that have been dipped into coal-oil or some other solvent.

More rapidly than by either of the two preceding methods can the object be accomplished by employing a solution of the compound in a volatile solvent, in place of the  
10 undiluted preparations, which latter, on account of their great viscosity, always require a long time to penetrate the leather. Such solutions I prepare by mixing one part of the  
15 sulphochlorinated compound, or mixture of compounds, with from one-half to one and one-half part of naphtha, benzine, photogen, coal-oil, or similar volatile liquids, and I either apply this solution to the leather or immerse  
20 the leather therein, as the conditions and nature of the article may indicate.

For leather in which only a very small percentage of fatty matter is permissible—as, for instance, in glove-leather—I employ very  
25 weak solutions containing about twenty-five percent. of the sulphochlorinated compounds, and I frequently, after an immersion of the leather in the solution, remove a portion of the solution again by forcing the leather between rollers, or by subjecting it to pressure  
30 in a press, or by whirling it in a centrifugal machine.

When the leather is to acquire to the highest degree those desirable properties which  
35 are imparted to it by the sulphochlorinated compounds, I extract from it all fatty matter which finished leather usually contains before submitting it to any of the previously-described treatments.

40 The extraction of the fatty matter I accomplish in the usual manner by means of bisulphide of carbon, naphtha, benzine, or any other volatile solvent for fats, and usually I do not deprive the leather (particularly not if it be  
45 tawed leather) of the solvent it has imbibed, but submit it at once to the treatment with the sulphochlorinated compounds or their solutions. Oil or fat tawed stock I prefer to submit to this last-described treatment immediately after it has been cured and dried,  
50 but before any superfluous portion of the fatty substance has been removed. After this treatment it is finished in the usual manner.

55 Rough leather, whether made by vegetable or mineral tannage, may be treated in the following manner: When the number of sides or pieces to be treated is so small that their stuffing cannot be successfully performed  
60 in a tumbler or fulling wheel, I slightly dampen the leather and loosen the fibers by boarding. If it is desirable to preserve a light color on the grain side, I apply one or two thin coatings of glucose and then allow  
65 the leather to dry. When perfectly dry, it is submitted to any of those treatments with the sulphochlorinated compounds or with

their solutions which have been described under finished leather. After this treatment, and when solutions have been employed, 70 after the evaporation of the solvent, the leather is softened by immersion in warm or cold water and finished in the usual manner.

Rough leather in large quantities is best stuffed with these compounds in a fulling- 75 wheel in a similar manner as is now practiced with other stuffing material. Merely heating the wheel up once with live steam, as is customary in stuffing with natural fats and oils, is only applicable with thin leather. 80 For stuffing heavy leather the wheel must be so arranged that it can be kept warm for a long time without introducing live steam. Of the many ways in which this can be accomplished I consider most advantageous to 85 either drive hot air into the wheel through one end of its tubular axis and allowing the air from the wheel to escape through the other end of the axis, or to pass steam through the tubular axis into one or two coils of pipe 90 attached to the inner side of one or both lateral walls of the wheel. The leather, which sometime before has been moderately dampened with water and thoroughly sammied, is thrown into the wheel after the air within 95 has been heated to about 65° centigrade, and when all of the leather has been introduced the wheel is made to revolve. Through one end of the tubular axis the liquid or liquefied sulphochlorinated compounds or their 100 mixtures with other substances are poured into the wheel, and the supply of hot air or steam is so regulated that the interior temperature remains between 45° and 60° centigrade. The wheel is kept rotating until the compound 105 or mixture has been entirely absorbed by the leather, which, according to the viscosity of the compound and the quantity to be introduced, may take from one to three hours. When this point has been reached, the leather 110 is taken out and hung up; or, if it is desired to clean the surface at once, it is thrown into cold water, and when well chilled returned to the wheel, which by this time has been allowed to become cold, too, and there rotated 115 in the presence of a large amount of cold water. If a supply of some clean coarse material—such as sawdust or spent tan—is at hand, I add a considerable quantity of it to the contents of the wheel, since such material by the friction it exerts upon the leather greatly hastens the removal of the particles of fatty matter adhering to the surface of the leather. After this cleansing process the leather is rinsed in cold water to remove the 120 sawdust or tanbark and hung up to dry.

The other manipulations to which the leather is subjected in finishing are the same as are in use with ordinary leather, save that previous to dyeing I remove all particles of the 130 compound from the surface by rubbing it off with a cloth that is saturated with coal-oil or some other solvent of the compounds.

The application of the sulphochlorinated

compounds in the conversion of hides or skins into leather by the operation of tawing or fulling is performed in about the same manner as is customary with the natural fatty bodies. After the hides or skins have undergone the usual preparatory treatments, they are, together with a suitable sulphochlorinated compound or its solution in volatile solvents, submitted to the action of any one of the various machines which in one way or another force the fulling substance into the interior of the hide or skin. By keeping the machines moderately warm or forcing a current of warm air over the hides or skins during the fulling, the operation is very much shortened. After the complete curing I frequently remove an excess of the compounds from the leather by throwing the same into a bath of some solvent—such as benzine, coal-oil, turpentine—and leaving it therein until sufficiently permeated by the solvent. When taken out of the bath, the leather is passed between rollers or subjected to pressure in a press, or whirled in a centrifugal machine, in order to force out a part of the solution and then hung up to dry. After this it is finished in the usual manner.

It being well known to professional cur-

riers that the introduction of a solid fat into leather or hide renders it firm, while that of a liquid oil gives it softness, the selection of the compound or mixture of compounds which is most suitable for any given quality of leather is a matter well understood by any competent carrier.

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

1. The improvement in waterproofing and preserving leather and hide, consisting in impregnating the leather or hide with sulphochlorinated fatty bodies, substantially as described.

2. The improvement in waterproofing and preserving leather and hide, consisting in impregnating the leather or hide with a solution of the sulphochlorinated fatty bodies in oils, fats, resinous substances, or hydrocarbons, substantially as described.

3. Leather and hide impregnated with sulphochlorinated fatty bodies, as set forth.

ADOLPH SOMMER.

Witnesses:

W. A. MCKOWEN,  
J. A. HAWTHORN.