

# UNITED STATES PATENT OFFICE.

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## TANNING COMPOSITION.

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*To all whom it may concern:*

Be it known that I, GEORGE HENRY RUSSELL, a citizen of the United States, residing at Newburg, in the county of Cumberland and State of Pennsylvania, have invented certain new and useful Improvements in Chemical Baths for Preparing the Hides of Animals, &c.; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a chemical compound for preparing the hides of animals and furs for any process of bark or extract tanning with or without the usual process of bating or depleting the hides in a manure or other bate, with or without the use of salt in the liquors during the process of tanning, and for the purpose of causing the bark or extract liquors to be absorbed more rapidly by the hide during the process of tanning it into leather, and for the purpose of preventing the rapid formation of gallic acid, and retanning imperfectly-tanned stock, and softening leather that is hard and cracky.

My invention consists of a bath or compound which is to be used for preparing the unhaired raw hide to be converted into leather, with bark or bark extract liquors, producing a leather of an exquisite fineness of grain, pliability, strength, and toughness of the fiber with a good fair color. It is also to be used on the ground bark in the leaches and in the liquors for the purpose of preventing the rapid formation of gallic acid. It is also to be used for retanning imperfectly-tanned leather.

In preparing the bath for seventy-five or one hundred hides I take water (700 gallons) seven hundred gallons. To this add three-fourths or one bushel of salt. Agitate the solution with a plunger until the salt is well dissolved. Then test its specific gravity with a barkometer. If the solution is too weak, add more salt until the barkometer shows 4° or 5°. 4° is for a weak solution and 5° for a stronger one. To the above solution add forty or fifty pounds of soda. Any kind of soda will do; but the bicarbonate of soda is to be preferred.

Agitate the solution with a plunger. Then test its specific gravity with the barkometer. Add soda until it shows 8° or 10°. The 8° is for a weak solution of the bath, and 10° a strong solution of it. To the above solution add two and one-half gallons of sulphuric acid, (oil of vitriol,) spreading the acid evenly over the surface as it is poured in. Then take a plunger and agitate the mixture thoroughly while it is effervescing and until it has ceased to effervesce. Then test its specific gravity with a barkometer. For a weak solution of the bath the barkometer should show about 10°, or 12° for a strong solution of it. The weaker solution is for light hides and the stronger solution for heavy hides.

The ingredients in the above compound should be proportioned so that the acid in the solution will not be in excess. It should be either neutral or alkaline. If the acid should be in excess, the intended results of the solution would be destroyed. When plump leather is to be made, the solution should be neutral. When a leather of a softer texture and finer grain is to be made, the solution should be alkaline, or the soda in excess. If the compound or chemical bath is used as an anti-acid on the ground bark or in the liquors to prevent the rapid formation of gallic acid and to promote a rapid absorption of the bark liquors, it should be alkaline.

The chemical bath is now ready to receive the raw unhaired hide, in which it is to be prepared for tanning it into leather, which is done as follows: After the hide has been limed and unhaired, it is the general custom to immerse it in a bath of chicken, bird, or dog dung, so that whatever lime may be in the hide is neutralized by the ammonia that is in the manure. It also depletes and softens the hide. The raw unhaired hide can be treated in the above or other bate in the usual way before it is immersed in the chemical bath; but I prefer that the above process of bating and neutralizing and softening of the hide be omitted entirely, and in lieu or instead thereof the hides be worked out of warm or cold water once or twice over the beam before they are immersed in the chemical bath.

The usual process of bating can be used



in combination with the chemical bath; but better results can be obtained in the leather tanned by omitting the bating or neutralizing of the lime process altogether. After the  
5 hides have been worked out of cold or warm water over the beam they are then ready to be immersed in the chemical bath, where they are prepared to receive the tan-liquors. When the hides are put into the chemical bath reel or  
10 handle them five or six times a day. Light hides and skins should be kept in the bath one and a half to two days, and heavy hides two to three days.

When the hides are in the bath, it will be  
15 observed that a chemical change takes place on the grain and in the fiber of the hides. The grain becomes coated over with a slime. This slime is greater when the bath is alkaline than when it is neutral. It is this slime  
20 that is formed on the grain that causes the grain to be made fine and close. Therefore the bath should be either neutral or alkaline. To make a leather of more plumpness and of a medium-fine grain, the bath should be neu-  
25 tral. To make a leather of extra fineness of grain and fiber, the bath should be alkaline. The hide is opened up while in the bath. It is softened and toughened, and its chemical conditions are so changed that it has a  
30 stronger affinity for the bark-liquors. The natural acids that are in the pores of the hide being neutralized by the bath, it causes it to tan more rapidly.

The hides having been prepared in the  
35 bath are now ready to go into the liquors to be tanned into leather as follows: Put the hides into a weak sweet liquor of about 5° to 8° barkometer test. Reel or handle them in this liquor until they are well colored.

40 If weight is an object, the hides should be plumped in the usual way and tanned in strong liquors; but to make a fine grade of leather the plumping process should be omitted.

45 The hides can now be tanned out by handling them in good sweet liquors graded from 20°, 25°, to 30° barkometer test. If the lay-away or hanging-in plan is adopted, change the liquors on them every five or ten days. It  
50 will be observed that the hides tan very fast, saving much time and labor.

To prevent the rapid formation of gallic acid in the liquors, put a few gallons of the chemical bath into the liquors during the pro-  
55 cess of tanning—that is, to a vat of about seven or ten hundred gallons of liquor.

It is the custom with some tanners to use salt in the strong liquors for the purpose of making increased weight in the leather and  
60 for increasing the specific gravity of the liquors. Salt can be used in the liquors in combination with the treatment of the hides in the chemical bath; but as it makes the leather porous and adds a fictitious weight we do not  
65 recommend its use in the liquors, except it

might be for tanning lining-skins and glove-leather.

The use of salt in the liquors is not new, and we do not claim its use, except in the above combination with the chemical bath. 70

After the hides have been run through the chemical bath and its strength is reduced it is worth its original cost to use it on the ground bark as a water-leach and for the prevention of the formation of gallic acid so  
75 rapidly.

It is well known that the hides of the warm-blood fishes—namely, the whale and porpoise—that inhabit the salt-waters of the oceans make a much finer grained and tougher  
80 leather than can be made from the hides of the warm-blood animals that inhabit the dry land. The toughness of the hides of the warm-blooded fishes is caused by the elements that constantly surround the fish and the exu-  
85 dation of acid through the pores of the skin. It is this exudation of the acid upon the elements that surrounds the porpoise that causes a slime to form upon its hide, forming a fine  
90 grain. It is this chemical action upon the hides of these fishes that toughens them.

An analysis of the salt-water of the ocean shows that it is composed of soda, salt, carbonic acid, and a little lime. In my chemical bath I have the same component parts—  
95 namely, soda, salt, carbonic acid, and a little lime—in the hide. By the lime not being neutralized in a bate and the sulphuric acid (in the minority) to correspond with the acid that is exuded through the pores of the skin  
100 of the fish I obtain corresponding results upon the hide that is immersed in the bath—namely, toughness of fiber and fineness of the grain. I made this natural process of the formation of toughness in the hides of the warm-blood  
105 fishes my guide in inventing the chemical bath, and this is wherein my discovery of the chemical bath for preparing hides for tanning, &c., is founded.

When the chemical bath is used for pre-  
110 paring furs for tanning, it gives to them a toughness and softness that is hardly to be attained by any other process of bark-tanning.

The use of the chemical bath as an anti-  
115 acid to prevent the rapid formation of gallic acid, which is always a loss to the tanner, produces great savings of bark.

To retan leather that is imperfectly tanned and to soften and toughen leather that is  
120 hard, first scour it well, then put it into the bath for twelve to twenty-four hours. Then tan it out by handling it in a strong liquor.

The usual time taken to tan leather that is processed in this chemical bath—that is, in the  
125 liquor—is, for calf-skins, thirty days; kips and light hides, thirty-five to sixty days; heavy hides, sixty days to one hundred and twenty days, according to the strength of the liquors used.  
130



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

5 The herein-described compound for tanning, composed of bark, bicarbonate of soda, salt, sulphuric acid, and water, in about the proportions specified.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE HENRY RUSSELL.

Witnesses:

SAML. E. KELSO,  
W. K. KELSO.