

# UNITED STATES PATENT OFFICE.

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## PROCESS OF TREATING HIDES.

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Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, FRANCIS J. OAKES, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Processes of Treating Hides, of which the following is a specification.

The present well-known liming processes for loosening the hair and epidermis in depilating or dehairing result in leaving the hides in a swollen condition and with an undesired content of caustic lime. The processes employed to obviate this swollen condition and remove part of this lime are usually termed "bating" or "puering" and are essentially putrefactive in character. To extract lime remaining thereafter, an additional process known as "drenching" is required, involving use of acid solutions.

The object of my present invention is to produce a process whereby said lime may be extracted with less destruction and loss of hide substance than heretofore, with more complete solution of the cementing material of the fibers, thus causing the hides to "fall" more perfectly from their said swollen condition, and without involving, necessarily, the so-called final "drenching" to extract the remainder of the lime. I attain these and other desirable objects by the use of my process hereinafter described, viz: I immerse and soak the undesirably-swollen hides, with their lime content, in an aqueous bath containing sulfur and a carbohydrate, it being understood that in the practice of my process any carbohydrate may be employed in conjunction with the sulfur, though glucose is in my present opinion preferable; also, that instead of sulfur any sulfur compound may be employed which will liberate some sulfur as such under the conditions existing in the bath, which involve as a distinguishing characteristic the presence of fermentative action in the carbohydrate. I refer to that particular fermentative action which results in the production of ethyl alcohol.

My process is preferably applied as follows: The swollen hides containing the said lime to be removed therefrom as they come from the dehairing process are, for instance, immersed and soaked in an aqueous bath the volume of which is approximately in the proportion of three pounds of water to one pound of hides and into which has been introduced sulfur in

the proportion of, say, five per cent. of the weight of the moist hides treated or five pounds of sulfur to three hundred pounds of water and glucose (syrup) in the same proportion. The temperature of said bath should be preferably maintained at about 100° Fahrenheit, and the hides should be turned in the bath occasionally to promote uniformity of action. The hides should be kept in said bath until the latter gives a permanent acid reaction, thereby indicating that said lime has been completely neutralized and has ceased to exist as such  $\text{Ca}(\text{OH})_2$  in the hides, the time required depending, of course, upon thickness and other qualities of the particular hides thereto subjected.

The proportions above stated may be varied somewhat according to special requirements of different classes of hides, as will readily be determined by actual test, the essence of my invention residing not so much in proportions merely as more broadly in the use of sulfur and a carbohydrate, as stated.

It will be understood that my said process necessarily involves the fermentation of the carbohydrate by which is produced ethyl alcohol, which is important to the production of the reactions required to generate the beneficial compounds requisite to produce the results characteristic of my invention. Such fermentation may in some cases be set up spontaneously by reason of some of the constituents contained in the bath when applied as aforesaid; but I find it preferable, if not essential, in all cases to introduce into the bath some specific ferment—such, for instance, as a small quantity of yeast sufficient to insure the aforesaid fermentation of the carbohydrate.

After withdrawal of the hides the bath solution is washed out of them by water in the usual way, and they will then be found to be not only "flat" and also substantially freed from the undesired lime, but also practically neutral—that is to say, neither unduly acidic nor alkaline—with the resulting advantage that they are then adequately qualified for immersion in the tanning liquors without being additionally subjected to the so-called "drenching" process.

While the advantageous novel results of my process are immediately and clearly discernible, it is in the present state of my information on the subject difficult, if not impossible, to explain comprehensively and exhaustively



all the reactions contributing, from a strictly chemical point of view, to the attainment of these results; but it may be said now that it seems that the reactions occurring in the bath, applied as aforesaid, result in the formation of various compounds, including particularly ethyl alcohol and carbon dioxid and that the presence of the sulfur results in the formation of hydrogen sulfid, which, thus being present in nascent state, is competent to act upon the alcohol and other resulting products of fermentation to form mercaptans, alkyl sulfids, and thio acids—as, for instance, thio-acetic acid ( $\text{CH}_3\text{COSH}$ )—which in turn act in conjunction with any excess of hydrogen sulfid upon the lime, and thus form soluble salts of calcium, which are readily removed from the hides by diffusion. Such mercaptans and thio acids while thus highly efficient to dissolve the lime are, nevertheless, of such weak-acid character as to prove non-injurious to the hide substance, in which respect they differ from the acids, notably acetic, &c., as well as from sulfur compounds, developed and utilized for a like purpose in previous processes. The excess of mercaptans, together with possibly some sulfonium compounds, appear also to act as a solvent for the cementing material of the fibers of the hides, the result being that the hides are thereby caused to fall. It seems that the reactions occurring under the conditions secured by my said process result in the aforesaid alcoholic fermentation as distinguished from putrefaction, whereby danger of destroying the hide substance itself is greatly reduced and with the result that undesired and objectionable substances only are removed from the hides. It seems also that there occurs a slight reaction between the lime and the glucose by which a small amount of saccharonic acid is produced, and it will be observed that my said process advantageously dispenses with the uncertain, expensive, disagreeable, and destructive dungs and the like hitherto so largely employed in bating and puering. It appears also that my said process does not depend upon direct action of the sulfur or its compounds upon the lime or its compounds—as, for instance, calcium hydroxid—but that its beneficial results are obtained through the solvent power of the compounds resulting from the fermentation of a carbohydrate in the presence of sulfur.

Having now described my invention, what

I claim as new, and desire to secure by Letters Patent, is the following:

1. The process of treating hides which consists in soaking them in a bath containing sulfur, and a carbohydrate in process of alcoholic fermentation.
2. The process of treating hides which consists in soaking them in a bath containing sulfur, and glucose in process of alcoholic fermentation.
3. The process of treating hides which consists in soaking them in a bath containing sulfur, a carbohydrate, and an alcoholic ferment.
4. The process of treating hides which consists in soaking them in a bath containing sulfur, glucose, and an alcoholic ferment.
5. The process of treating hides which consists in soaking them in a bath containing a substantial proportion of sulfur, say five per centum of the weight of the hides, also a substantial proportion of a carbohydrate, say likewise five per centum of the weight of the hides, and an alcoholic ferment.
6. The process of treating hides which consists in soaking them in a bath containing a substantial proportion of sulfur, say five per centum of the weight of the hides, also a substantial proportion of glucose, say likewise five per centum of the weight of the hides, and an alcoholic ferment.
7. The process of treating hides which consists in soaking them in a bath containing sulfur, a carbohydrate, and yeast.
8. The process of treating hides which consists in soaking them in a bath containing sulfur, glucose, and yeast.
9. The process of treating hides which consists in soaking them in a bath containing a substantial proportion of sulfur, say five per centum of the weight of the hides, also a substantial proportion of a carbohydrate, say likewise five per centum of the weight of the hides, and yeast.
10. The process of treating hides which consists in soaking them in a bath containing a substantial proportion of sulfur, say five per centum of the weight of the hides, also a substantial proportion of glucose, say likewise five per centum of the weight of the hides, and yeast.

FRANCIS J. OAKES.

Witnesses:

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ALLEN ROGERS.