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DEARMORING PROCESS.

No Drawing.

Application filed July 23, 1921. Serial No. 487,210.

To all whom it may concern:

Be it known that I, THEODORE H. KOHLER, a citizen of the United States and residing at Bloomfield, in the county of Essex and State of New Jersey, have invented new and improved Dearmoring Processes, of which the following specification is a full disclosure.

This invention deals with the preparation of shark skins and the like, for commercial uses, and more particularly to a method of treating the skin of armored fish in the production of leather therefrom.

The skins of armored fish, particularly shark skins, possess a physical characteristic that has heretofore been a source of great embarrassment to tanners who have sought to convert such skins into leather. The skin of sharks is protected by a species of armour which is papillate-scabrous in nature and as far as I am aware cannot be removed completely by the methods heretofore available to tanners without injury to the skin. The papillae constituting this armour are each embedded in the epidermis. These papillae comprise minute teeth-like projections on the skin which are very hard, are an excellent abrasive, and under the microscope have the appearance of minute closed fists of a shiny glass-like-appearance, and are commonly referred to as the "shagreen." This dermal armour varies in thickness up to one-sixteenth, or even three thirty-seconds, of an inch; depending upon the age of the shark. Such armour is so impenetrable that it is difficult to sew through it with a needle or easily to sever it with a knife. Accordingly, those engaged in converting the skin into leather have endeavored to get rid of the armour; but with little success. Attempts have been made to grind it off with a suitably-grained emery-wheel, but without success because the wheel merely has the effect of tearing up the grain and removing the superficially projecting portions of the papillae without, however, getting at their roots; which remain as imbedded stumps, so to speak. A skin produced in this manner will not uniformly accept color, inasmuch as the papillae are impenetrable to color and manifest no tendency to enter into a chemical combination with any of the available dye-stuffs.

Attempts have likewise been made to treat the whole fish before skinning with boiling water and then to scrape off this armor by

means of a knife, as set forth in the Rogers Patent #1,338,531, and also to eliminate it by a chemical action preparatory to tanning as in the Rogers Patent #1,395,773, but such agents as have been proposed operate injuriously on the skin itself, gelatinizing or otherwise impairing it so as to make it practically useless. The impossibility of eliminating this armour has caused tanners to abandon such attempts and to endeavor to produce a useful leather by subjecting it to metallic tanning agents, such as compounds of chromium; or by resorting to other methods of tanning. The product, however, did not present the grained texture of real leather and was unsatisfactory. Furthermore the coloring materials could not be made to combine with the armour.

This invention, however, proposes a remedy for the aforesaid difficulties, and it is based upon certain discoveries that I have made as a result of extensive and persistent investigations. I have ascertained that a raw skin, that is, the skin after removal from the fish, is much less resistant to certain agents than the papillae, and this condition is reversed when both the papillae and the raw skins are subjected to certain (but not all) tanning methods. For example, if the raw skin be subjected to a metallic agent, such as those used in the so-called chrome process, any agent which I have tried—and I have tried many—capable of materially affecting the papillae injuriously affected the tanned skin by decomposing the chromium salt that is, untanning the skin or gelatinizing the "chrome-tanned" skin. I have made the remarkable discovery, however, that, if a vegetable tanning process be resorted to, no appreciable inversion will take place when the tanned skin and its armour are subjected to the de-armoring agent; although such agent would have destroyed a raw skin or one tanned by a metallic process.

In order that those skilled in this art may more thoroughly comprehend the unique principles underlying this discovery and be enabled to put this process into practice, reference will be had to a typical instance of the method preferred by me for treating shark-skins.

The raw skin may first be thoroughly tanned by means of suitable organic tanning agents, such for example as the vegetable tanning extracts of quebracho, hemlock,

sumac, oak, gambier, etc. The tanning methods set forth in the United States Patents Nos. 1,230,266, June 19, 1917, and 1,256,974, Feb. 19, 1918, to Kristian Bendixen, may be resorted to except in so far as they refer to the use of chrome tanning materials. It is important that the tanning be thoroughly accomplished, and that vegetable or organic agents be employed. I have discovered that the effect of this tanning agent is to convert the raw skin into a true leather, displaying a high resistance to an agent capable of acting on the papillae which, for some reason, are not rendered resistant thereto in the course of the specified tanning process. I have discovered that hydrochloric acid, when suitably used on a properly prepared skin, will answer the purpose of disintegrating or loosening the papillae without injuriously affecting the hide proper.

The next step may, accordingly, be effected advantageously by putting the tanned skins into a tumbling barrel containing a solution of hydrochloric acid in the proportion of from twenty-two to twenty-four gallons of hydrochloric acid (at 18 Be.) to about five hundred pounds of skin. The rotation is continued for two to three hours, with the result that the papillae are loosened or disintegrated and are, by the attrition, separated from the hide, somewhat as a corn may be separated from the ear, and may be washed away as minute nodules. Then washing is effected for about an hour by continuing the rotation; using water. Thereby, the acid is eliminated. The final washing may be accomplished preferably by means of a solution of borax (say one pound of borax for each two hundred pounds of hide) and any residual acid is thereby neutralized.

The hides from the tumbling barrel will be found quite free from any armour and will be perfectly tanned and nowise injured by the treatment, but in a condition to undergo any suitable finishing processes. The hide now has a peculiar appearance. It has the natural irregular grained appearance which is inherent in the natural skin, covered throughout with what appears to be minute pores which are the depressions or sockets in which the nodules of the armor formerly were seated. It may be used in this condition or may be further treated by any of the ordinary finishing processes. The hides now will readily and uniformly accept the coloring material conveniently employed for finished leather and, after this coloring has been done, they may be oiled and dried and are thus made ready for the market.

The resultant leather displays a handsome grained surface entirely devoid of its original armour and is tough and tenacious to

an extraordinary degree and may be readily cut, sewed, embossed and otherwise worked up into various articles of manufacture. The product described herein is claimed in my co-pending application #487,211, filed July 23, 1921.

As an alternative to the above-mentioned continuous scale-removing steps, it is quite feasible to apply the acid by hand to the previously-tanned hides by painting a succession of coats of acid on the armoured side at intervals of about six hours until the papillae have become sufficiently disintegrated and loosened from the epidermis to permit them to be eliminated by the action of water and a scraping implement. It has been found that the acid mentioned has the effect of rendering the papillae more or less soluble in water, probably by converting them into gelatine so that their removal becomes a simple matter. The agent proposed has the further advantage of being inexpensive, very effective and quick in its action. The principles herein disclosed I believe to be applicable to kindred armoured-skins, such as those of a sword-fish; and other equivalent agents having a differential effect on a differentially-tanned skin may be used, although hydrochloric acid is the agent that I have found best adapted for the purpose.

I therefore claim as new and desire to secure by Letters Patent:

1. The art of de-armoring a fish skin which comprises tanning the skin and thereafter removing the armor therefrom.

2. The method of producing a scale-free leather from a shark-skin, which consists in differentially tanning the entire skin through the agency of a vegetable tanning-bearing material; subsequently subjecting it to an agent to which the thoroughly tanned leather is resistant, whereby the incompletely tanned armour may be disintegrated and its adhesion diminished; and thereafter removing the papillae constituting the armour.

3. The process of treating a fishskin having an armor thereon, which comprises tanning the raw skin into leather with the armor still embedded therein, then treating the skin with an armor-loosening agent and then removing the armor.

4. A process of treating the skin of an armored fish which comprehends the preliminary step of tanning the skin by means of a vegetable tanning compound, subsequently subjecting the skin to the action of an agent adapted to exercise an armor-loosening effect, and then removing the armor.

5. A process of treating the skin of an armored fish which comprehends the preliminary step of tanning the skin by means of a vegetable tanning compound, subsequently subjecting the skin to the action of a

halogen acid adapted to loosen the armor and then removing the said armor.

6. The method of producing a scale-free leather from a shark-skin, which consists in 5 differentially tanning the entire skin through the agency of a vegetable tanning-bearing material; subsequently subjecting it to an acid to which the thoroughly tanned leather is resistant, whereby the incompletely tanned 10 armour may be disintegrated and its adhesion diminished; and thereafter removing the papillæ constituting the armour.

7. The process of treating a fish skin having armor thereon which comprises tanning 15 the raw skin into leather with the armor thereon, then treating the skin with hydrochloric acid thereby rendering the armor readily removable.

8. A tanning process which comprehends 20 the preliminary step of converting a hide into leather by means of a vegetable tanning compound, thereafter subjecting the hide to the action of a hydrochloric acid solution to assist in the removal from the hide of in- 25 completely tanned portions and thereafter removing the said incompletely tanned portions.

9. A process of treating the skin of an

armored fish which comprehends the preliminary step of tanning the skin by means 30 of a vegetable tanning compound, subsequently subjecting the skin to the action of an agent adapted to exercise an armor-loosening effect and then removing the armor by attrition. 35

10. A step in the process of preparing tanned leather from an armored fish skin such as shark, which consists in treating the skin, after removal from the fish but with the armor thereon, with an armor-loosening 40 agent, and then substantially completely removing said armor.

11. A step in the process of preparing tanned leather from an armored fish skin such as shark, which consists in treating the 45 skin, after removal from the fish but with the armor thereon, with an aqueous solution of hydrochloric acid and then substantially completely removing said armor.

In witness whereof, I hereunto subscribe 50 my name, as attested by the two subscribing witnesses.

THEODORE H. KOHLER.

Witnesses:

H. S. DATTENHEIR,
IRMA SCHNIDER.