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TREATING SKINS, HIDES, AND PELTS

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This invention relates to an improvement in the processing of skins, hides and pelts (hereinafter referred to collectively as skins) in preparation for tanning, and the invention has for its principal object the provision of means, applicable to any or all of the preparatory processes prior to pickling, drenching and tanning, where lime or any calcium compound is or may have been used, for more adequately controlling that element of the processing medii.

Another object is to provide means whereby skins, after lime treatment and resulting swelling, may be brought back to the desired fallen or "bated" condition, i. e., to a flaccid and approximately neutral pH state, without removal of the lime content.

A more specific object of the invention is to provide a method of control of the aforesaid character, whereby the residual calcium content of the skins at the termination of said preparatory treatments shall be present wholly, or substantially so, in the form of a neutral compound, or compounds, of that element.

Another object is to provide a method of control, as set forth, which shall, with safety, permit the presence in the skins at the termination of said preparatory treatments of larger quantities of calcium than has been practical under the prior practices.

Still another object is to provide a method of the character described that shall be capable of functioning efficiently with any character of liquid or semi-liquid treating medium and independently and irrespective of temperature conditions and pH values.

Another and more general object is to provide a novel method of treatment in preparation for tanning that shall yield a better conditioned and superior skin and a correspondingly improved end product.

The invention further contemplates the provision of a generally improved and advantageous method for bringing swollen skins to the proper pH value of the fallen or flaccid state.

The use of lime in the processing of skins preparatory to tanning, in depilation for example, creates certain problems of a more or less complex nature affecting the process as a whole. It becomes necessary, for example, in all subsequent treatments of the skins to take into account and to adequately provide for the presence in the skin of that substance, the effect of the lime or other calcium compound upon the treating medium and its pH value, and primarily the effect upon the skin itself. In general, it has been considered desirable and even necessary to remove from the skins prior to tanning, and prior to the drenching and pickling operations which may immediately precede tanning, all, or as much as possible, of the residual calcium from the skins, and it is customary to employ extensive operations for the removal or neutralization of that element. In those operations, also, it has been customary to employ acids some of which constitute a potential source of damage to the skins, and requiring, therefore, exact and careful control. In other instances, ammonium salts are used but in every case the processes are calculated to remove, and are of such a nature as necessarily to remove, the calcium or the greater portion thereof from the skins. These prior deliming operations, furthermore, both in their own nature and because of the limitations imposed by the other essential preparatory processes, have never been capable readily of the control required for exactly uniform results.

I have found that the presence of calcium, as such, in the skins in reasonable amounts is not detrimental to the tanning process, and in fact is frequently beneficial by facilitating the penetration of skins by the active tanning agents, but that it is essential that the calcium contained in the skin shall be present in the form of a neutral compound or compounds of that element. I have discovered, further, that carbon dioxide (CO_2) constitutes an agent highly adapted for that purpose, and one that is capable, as hereinafter described, of affording the closely controlled and highly uniform results required for the production of a consistently superior leather product.

In the practice of my invention, carbon dioxide may be injected, as such, into the liquid treating medium and in the presence of the skins in any or all of the conventional preparatory processes, such, for example, as depilation, deliming, bating, reducing, and falling, or in any combination or joint working of these processes, where, of course, lime or any calcium compound, is or has been used. The quantity of CO_2 thus injected is not critical and may be considerably in excess of the minimum required to convert the calcium content of the skins to the desired neutral form or condition. The minimum amount of CO_2 required to produce the desired result may readily be determined by test, and since this agent is a weak acid in reaction, and cannot, therefore, adversely affect the skin, there need be no critical consideration as to maximum amount, and an excess of even considerable proportion is not detrimental. When so used, the CO_2 forms H_2CO_3 with the

water present, which readily penetrates the skins, and has the effect of converting the lime or other calcium content of the skin to the form of a neutral compound or compounds, and tends, further, to precipitate any soluble calcium present in the skin, also in the form of a neutral compound, and to thereby increase the calcium content of the skin. Since excess of CO_2 may be employed without detrimental effect, positive assurance may be had that all, or substantially all, of the calcium present in the skins at the termination of the preparatory treatments shall be in the desired neutral form.

The use of carbon dioxide in accordance with my invention in no way complicates or requires modification of the conventional processes employed in the treatment of skins preparatory to tanning. The use of carbon dioxide on the other hand ends to simplify the conventional operations and to render them less critical in character. It is possible, for example, in the bating or other process to reduce the amount of or even to entirely eliminate the use of ammonium chloride or other buffer or deliming material required in the conventional procedures to maintain the pH value at a substantial constant.

The use of carbon dioxide in accordance with my invention has the additional advantage that it can be successfully employed in substantially any character of treating medium. It is to be noted further that by the use of this highly efficient medium for the stated purpose and the assurance that it affords the elimination in the skins of calcium, except in neutral form, there is not the same necessity, as in the prior processes, for removing residual lime from the skins, and that accordingly the steps of the said prior processes calculated to effect a substantial removal of the calcium from the skins may be modified or eliminated, with the result that the amount of calcium present in the skin at the termination of the preparatory processes, all in the form of neutral compounds, may materially exceed the lime content of the skins under the prior processes, thereby facilitating and improving the subsequent tanning process as set forth above. It may be used, for example, in both sterile and non-sterile liquids, or in any combination of such liquids. It may be used also in the presence of liquids containing fermenting or fermentable substances, bacteria, molds, enzymes, catalysts or any of the chemicals or combinations of chemicals employed in the treatment of skins.

Instead of introducing carbon dioxide, as such, into the treating liquors, this agent may be generated or formed by reaction of suitable chemicals added to the liquid, or a combination of these two methods may be employed. The invention is not limited to any specific method or methods for rendering the carbon dioxide or carbonic acid available in the process for reaction with the calcium.

The invention may be further practiced by subjecting moist or wet skins to the action of a carbon dioxide atmosphere.

While the invention has application of particular value, as described above, in conjunction with treatments of skins by a calcium process, it will be apparent that the use of carbon dioxide or carbonic acid in the manner set forth affords a highly useful method for neutralizing other alkalies, such for example as caustic soda, and the effects of such alkalies upon the skins. In such cases, it has been found that the presence of the carbonic acid or carbonic acid gas affords a sufficient buffer effect to bring the skins rapidly and economically to the proper pH value of the fallen or flaccid state.

I claim:

1. In the preparation of skins for tanning, the process which comprises treating the skins with lime, and subsequently bating the calcium-swollen skins with prepared enzymes in the presence of carbon dioxide.

2. The process for bating lime-treated skins, which consists in subjecting the skins to the action of a prepared enzyme in the presence of carbon dioxide.

3. The process which consists in immersing lime-treated skins in a bath containing a solution of a prepared enzymic bating material, and regulating the pH value of said bath by injection of carbon dioxide.

4. The process which consists in bating lime-treated skins with a prepared enzymic bating material, and regulating the pH value of the bating liquor by means of carbon dioxide.

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