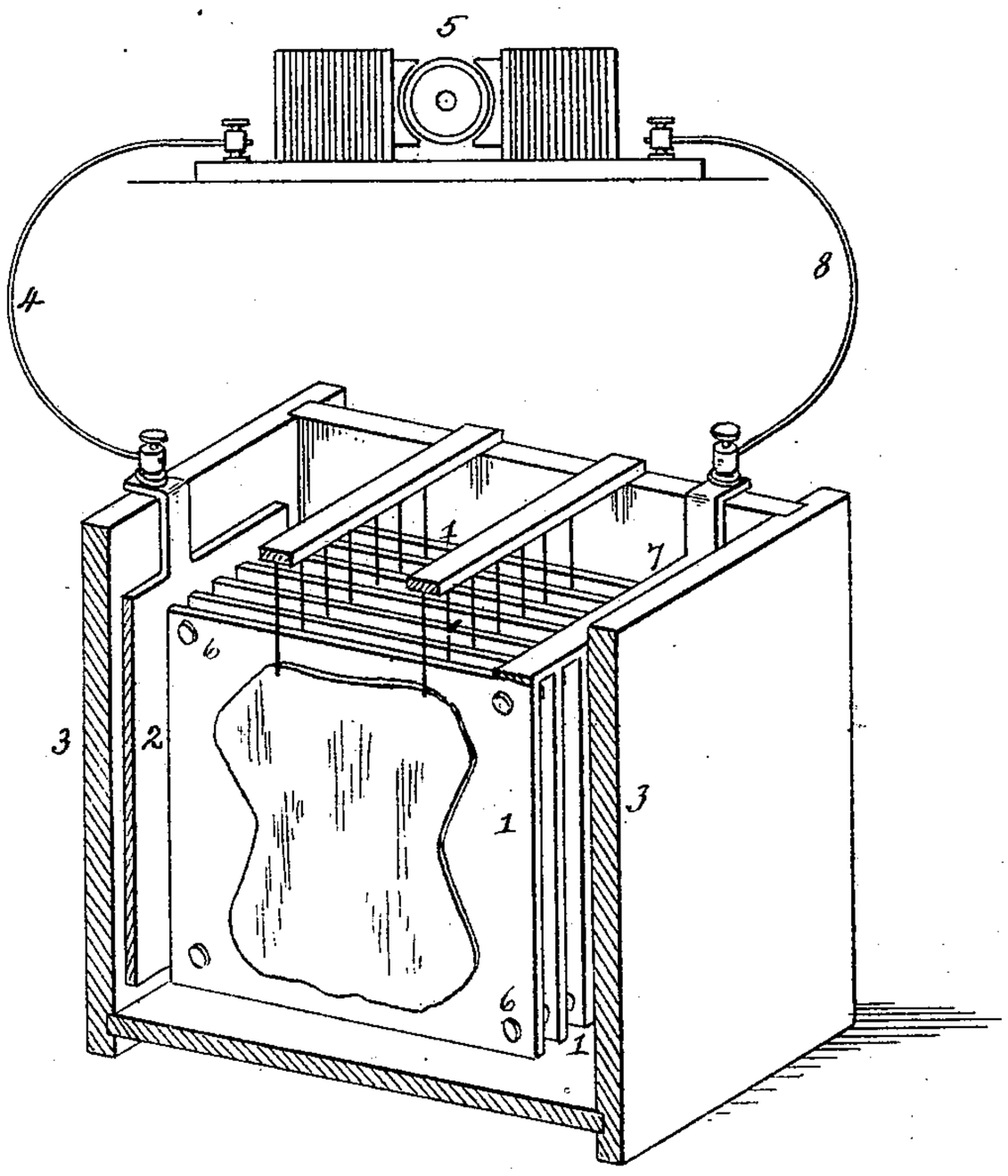
No. 620,056. Patented Feb. 21, 1899.

S. P. SADTLER.

PROCESS OF TANNING HIDES OR SKINS.

(Application filed Oct. 21, 1897.)

(No Model.)



Witnesses:
James C. Grayer.
Charles DeCow.

Inventor:
Samuel P. Sadtler
by his Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

SAMUEL P. SADTLER, OF PHILADELPHIA, PENNSYLVANIA.

PROCESS OF TANNING HIDES OR SKINS.

SPECIFICATION forming part of Letters Patent No. 620,056, dated February 21, 1899.

Application filed October 21, 1897. Serial No. 655,929. (No specimens.)

To all whom it may concern:

Be it known that I, SAMUEL P. SADTLER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented a certain Process of Tanning or Tawing Hides or Skins, of which the following is a specification.

My invention relates to a new process for the treatment of skins and hides for the purpose of making leather in connection with what is termed "mineral" or "chrome" tanning. It is known that if hides or skins are impregnated with a chromate, such as bichromate of potash, and an acid, such as hydrochloric or sulfuric acid, and then submitted to the action of a reducing agent sufficiently rapid in its action chromic oxid is separated out through the body of the skin and an insoluble leather possessing numerous excellent qualities is obtained. Various reducing agents have been proposed, such as a hyposulfite or sulfite in the presence of an acid, free sulfurous acid, hydrogen sulfid, either as gas or evolved from a metallic sulfid in the presence of an acid, hydrogen dioxid, either used directly or evolved from a metallic peroxid in the presence of an acid, besides a variety of substances—such as ferrous sulfate, cuprous sulfate or chlorid, oxalic acid, &c.—of greater or less activity. I do not desire to use any of these in my process, but have discovered a cheap, efficient, and superior reducing agent to be nascent hydrogen electrolytically produced, such agent effecting the reduction to chromium sesquioxid of the chromic acid with which the skin is impregnated. I have after prolonged experiment arrived at a method by which the electrolytically-produced nascent hydrogen can be made to act upon the chromic acid *in situ*, so that an immediate combination of the hide fiber and the liberated chromium sesquioxid takes place. The result is a chrome-tanned leather with all the characteristic qualities of insolubility in water, freedom from shrinking, softness, and pliability recognized as belonging to this class of products. There are no side products to be washed out of the tanned skins, the sole product of the reaction besides the chromium sesquioxid being water.

The accompanying drawing shows one form of apparatus designed for the carrying out of my process.

I take a number of thin conducting-plates 1, such as platinum or lead, slightly larger than the skins to be tanned. These metallic plates are all connected together at one or more points 7 and the connection continued outside of the tank or jar 3 and joined to a wire 8, leading to the negative pole of the dynamo or other source of electric supply, which is conventionally or diagrammatically represented at 5. In this way the metallic plates constitute the negative electrode of a galvanic couple.

The skins, having been properly prepared by immersion in a bath containing bichromate of potash and sulfuric acid, are placed between the metallic plates, which are separated from each other to an extent slightly greater than the thickness of the skin, this separation being effected by any suitable means, such as blocks or strips of rubber or wood 6 or any other mechanical device which will prevent the metallic plates 1 from holding the skin too tightly between any two plates. The impregnated skins having been placed between the metallic plates constituting the negative electrodes, the whole is then immersed in a bath which is by preference similar to the one by which the skins are impregnated. A solution in water of three per cent. of sulfuric acid and five per cent. of bichromate of potash constitutes a very effective electrolytic bath for the purpose, as it prevents any washing out of bichromate from the impregnated skin.

The impregnation of the hides or skins may, if desired, be effected by the same bath which constitutes the electrolyte, although it is preferable to impregnate the skins before introducing them into the electrolytic bath. The positive electrode 2, which may be made of any suitable conducting substance—such, for example, as a sheet of lead or conducting-carbon—may be placed in one end or side of the tank or receptacle 3, in which the operation is to be performed, or may be suspended above the metallic plates, care being taken to prevent contact with the same, and the terminal of such electrode is connected, as by a wire 4, with the positive pole of the dynamo or other source of electrical supply. On clos-

ing the circuit hydrogen is liberated from all the surface constituting the negative electrode and in close proximity to the skins which are adjacent thereto. The reaction which takes place may be described as follows: Bichromate ($K_2Cr_2O_7$) is broken up into the sesquioxid of chromium, (Cr_2O_3)+O_3, + potassium oxid, (K_2O,) which latter in the presence of sulfuric acid becomes sulfate of potash, (K_2SO_4.) It is therefore these three atoms of oxygen with which the nascent hydrogen liberated at the negative electrode combines to form water, and thereby indirectly reduces the chromic acid in the bichromate to sesquioxid of chromium, which remains in the skin and converts it into leather.

Of course many other ways than the one above described will suggest themselves to any one skilled in the art for carrying out the above process, such as folding the skins over the plates one-half on each side instead of between the plates or in mounting and connecting the plates in various ways other than that described.

My invention may be carried out by the use of other salts than a chromium salt—such, for instance, as salts of iron or aluminium. In fact, in its broadest form the invention consists in the application of electrolytically-produced hydrogen to any mineral salt which is capable of yielding under the action of such hydrogen a metal, metallic oxid, or compound which will unite with the fiber of the hide to form leather.

As an instance of a specific method of carrying out my process I may state that I have in practice operated on goat-skins by cutting them up into pieces about six and one-half inches square, making about eight pieces for the average-sized skin. Three of these pieces I then piled with a pair of lead plates, one of the pieces being between the plates and one on the outside of each plate, the pile being completed by the application of two connected plates outside of the pieces of skin. The whole was then placed in a bath of bichromate of potash, in which the skins had previously been steeped, and the plates between the pieces of skin were connected to the negative electrode of a source of current-supply and the outer plates were connected to the positive source of supply, and a current of five amperes at four-volts pressure was passed through the solution for five hours, at the end of which time the skins were found to be thoroughly tanned or reduced to leather. It is to be observed that when whole goat-skins in great numbers are mounted with the plates the amount of current necessary to be employed will be materially reduced, as the internal resistance will be proportionately less with the increased size. The bath in which this operation was conducted was at the ordinary temperature and consisted of bichromate of potash to which had been added one-half of one per cent. of sulfuric acid.

I find it decidedly advantageous to electrolyze the bichromate solution prior to putting in the skins, or, what amounts to the same thing, to use the bichromate solution over and over again.

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

1. The mode herein described of tanning or tawing hides or skins, said mode consisting in impregnating the hides or skins with a metallic salt which is capable of yielding, under the action of hydrogen, a metal, metallic oxid or compound, which will unite with the fiber of the hide to form leather, and then subjecting the hides or skins to the reducing action of nascent hydrogen electrolytically produced.

2. The mode herein described of tanning or tawing hides or skins, said mode consisting in impregnating the hides or skins with a chromate and an acid, and then subjecting them to the reducing action of nascent hydrogen electrolytically produced.

3. The mode herein described of tawing or tanning hides or skins, said mode consisting in suspending the said hides or skins in a chromate and acid bath adjacent to the negative plates or poles in said bath, and then passing an electric current through the bath.

4. The mode herein described of tanning or tawing hides or skins, said mode consisting in impregnating the hides or skins with a chromate and acid and mounting the skins or hides between metallic plates acting as the negative poles of an electrolytic bath, then passing an electric current through the bath.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL P. SADTLER.

Witnesses:

WILL. A. BARR,

JOS. H. KLEIN.