May 17, 1927. 1,628,966

C. J. GLASEL

TANNING APPARATUS

Filed Sept. 16, 1919

FIG. 1.

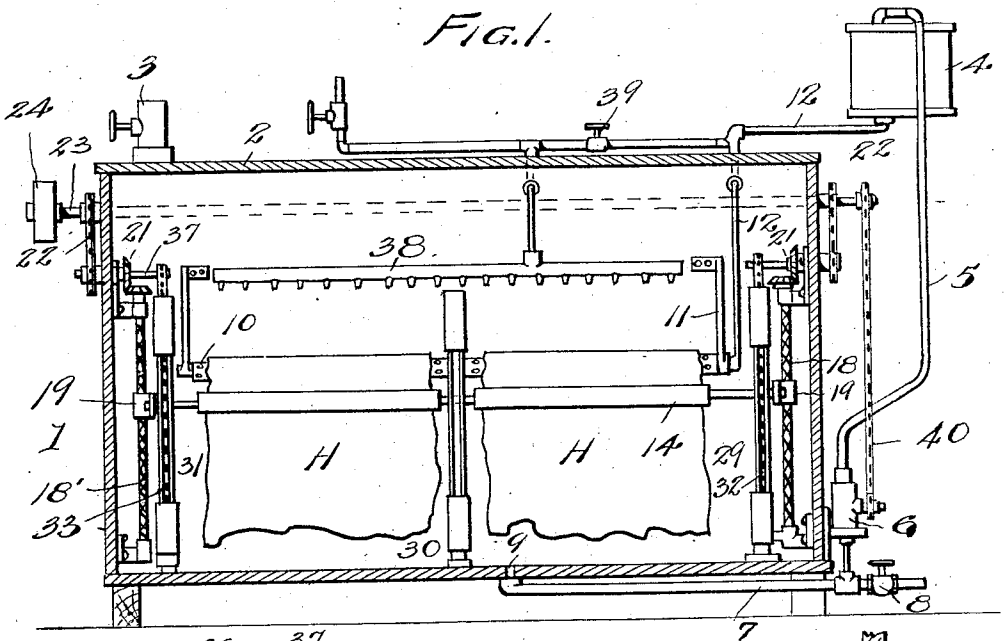


FIG. 2.

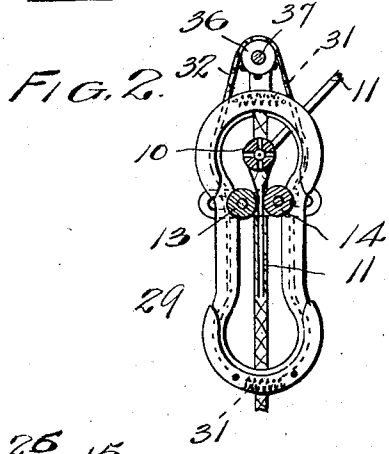


FIG. 3.

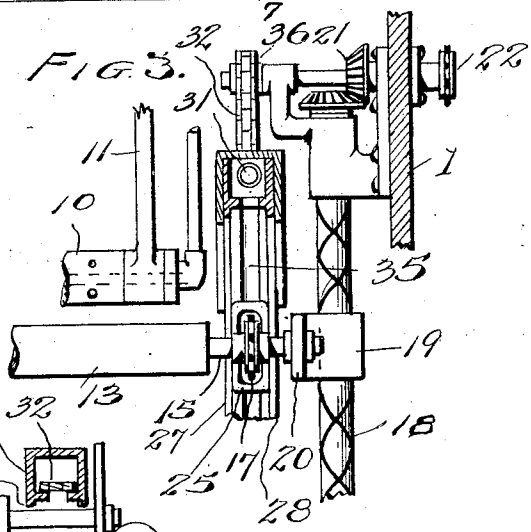
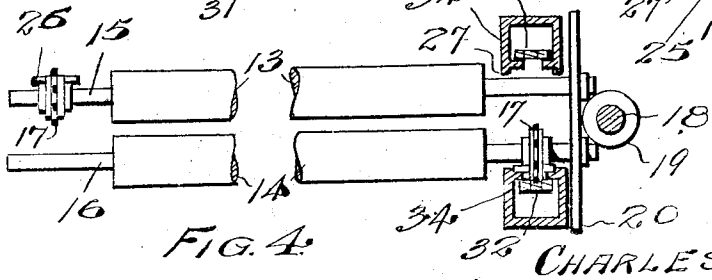


FIG. 4.



Inventor

CHARLES J. GLASEL

by Chas K. Davies

Attorney

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UNITED STATES PATENT OFFICE.

CHARLES JOHN GLASEL, OF NEW YORK, N. Y.

TANNING APPARATUS.

Application filed September 16, 1919. Serial No. 324,191.

My invention relates to a method for treating hides and skins by subjecting them to a series of successive steps in a process of attaining a finished leather product during a minimum period of time and with the expenditure of comparatively little labor and material thereby substantially reducing the cost of production of the finished leather.

The improved method or process of my invention consists essentially in the performance of a series of successive treatments of the hide or skin involving the application of different liquid solutions thereto whereby the hides are softened and cleansed, depilated, plumped, tanned, fat liquored, bleached and dyed. In the performance of these various steps in the process the hides are confined in a container and subjected to the action of mechanism which works, stretches, smooths and relaxes the hides in the presence of the liquid treating solutions.

These different solutions are applied to the hides and skins in successive order as the condition of the hides warrants, each solution being removed from the hides and container after it has performed its function, and then the succeeding solution is applied. For this purpose I employ a tank or container and apparatus including a circulation system whereby the liquid solutions are each successively conveyed to and brought into contact with the hides in the container, and then withdrawn from the container for subsequent use.

Water is employed in the circulation system when necessary for washing the hides after any of the steps in the treatment. Means are provided for uniformly distributing the liquid solutions or concoctions to one or both surfaces of the hides, and the utilization of my invention permits the employment of a great variety of treating solutions in the production of the leather product.

In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention wherein one form of apparatus is exemplified for carrying out the principles of my invention, but it will be understood that various changes and alterations may be made in the illustrated apparatus and in the performance of my process, within the scope of my claims without departing from the principles of my invention.

Figure 1 is a view in vertical section of a container or tank, illustrating the hides therein, together with mechanism for working the hides, and the circulation system for applying and withdrawing the liquid solutions used in the improved process.

Figure 2 is a detail vertical sectional view showing one of the supporting and guiding frames for the working rollers.

Figure 3 is a view in section of one of the roller frames, parts being broken away for convenience of illustration.

Figure 4 is a broken plan and sectional view showing the driving relation of the rollers of a pair.

Referring to the drawings wherein one exemplification of the apparatus employed is shown, the container or enclosure 1 is a tank of suitable dimensions provided with a removable top 2 and a vent device 3 in the top. For supplying the liquid solutions to this tank and to the hides H therein a reservoir 4 is illustrated in an elevated position and provided with a return pipe 5 and pump 6. The return pipe is connected with a draw-off pipe 7 having a discharge cock 8, and the draw-off pipe 7, which is located beneath the tank or container 1 is connected to an outlet 9 from the bottom of the tank. Thus the liquid solutions in the tank may be pumped into the reservoir 4, and by means of the discharge or test cock 8 the liquid solution may be tested to ascertain the condition thereof.

The hides H are supported or suspended within the tank preferably on holders or carriers 10 which are made up of perforated bars supported in suitable manner from the tank, as by hangers 11, and these hollow perforated bars are connected by a feed pipe 12 with the reservoir 4. The liquid solutions flow by gravity from the reservoir through the feed pipe and are distributed between the folds of the hides by the perforated suspending bars 10, the folds forming a pocket as seen in Fig. 2 for the solution as it drips or flows from the hollow perforated bar.

While being subjected to the treating solution the hides are worked, each one by a pair of complementary rollers as 13, 14, disposed horizontally in the tank and adapted to reciprocate vertically with the folds of the hide therebetween as indicated in Fig. 2. A suitable number of pairs of rollers is employed and they are rotatable on their shafts 15 and 16 and each of these shafts has a sprocket wheel 17 thereon one of which

wheels is carried at the opposite ends of the shafts. The pairs of rollers are reciprocated vertically from a pair of vertically arranged screw bars as 18 and 18', one at each end of the tank, which are provided with reverse spiral threads that actuate the travelling nuts 19 on each screw bar. Each of these nuts has a slotted bearing plate 20 for the journal ends of the pairs of roller shafts 15 and 16. The screw bars are journaled in bearings attached to the inner faces of the end walls of the tank and at their upper ends a gear couple 21 is provided for revolving the screw bars to reciprocate the travelling nuts. The gear couples are driven from sprocket mechanisms 22 exterior of the tank and located at its ends, and these sprocket mechanisms are driven from the main shaft 23, supported from the outer face of the tank near its upper end, and revolved by pulley 24 from a suitable source of power.

For guiding the pairs of working rollers in their reciprocal vertical movement I utilize in connection with the sprockets 17 and shafts 15 and 16 a number of hollow resilient frames as will be described.

The sprocket wheels 17 are carried in slides as 25 and 26 that co-act with flanges 27 and 28 arranged vertically on the resilient guides, three of which are indicated in Figure 1 as 29, 30, 31, and these guides are provided with resilient means as springs 31 shown in dotted lines whereby the pressure of the rollers 13 14 on the hides may be adapted to the hides as the rollers work in their reciprocal movements.

The slides 25 and 26 move in the channels of the frames as the rollers 13 and 14 reciprocate, and at the upper end the guide frames are spread to guide the rollers away from the supporting bar 10. The lower ends of the frames are enlarged to guide the rollers away from the lower edges of the folded hide as they pass downwardly, and to bring the rollers back to the hide for the initial upward movement.

To insure the proper rolling action of the complementary rollers 13 and 14 on both their down and up strokes in contact with the hide, a pair of continuously moving endless sprocket chains 32 and 33 are employed. These chains are located at opposite ends of the vat or tank and pass around the hollow guide frames, between flanges 34 thereof. A slot 35 is provided at the inner side of the hollow guide frame through which the sprocket 17 projects with its teeth in the path of movement of the flights of the endless chains, and the action of these flights on the sprocket wheels insures that the rollers, in pairs, shall turn properly to "work" the hide on both the down stroke and the up stroke of the pair of rollers.

The sprocket chains 32, 33 are driven by sprocket wheels 36 that are carried by and operated with gear shafts 37 through which movement is transmitted to the screw bars.

In some instances for applying liquid solutions to the outer faces of the suspended or supported hides, a distributing pipe 38 having a control valve 39 may be supplied from the pipe 12, to spray the hides.

The pump 6 is operated from the main shaft 23 by sprocket connection 40. The apparatus here illustrated and described, it will be understood is merely typical of many other means that may be employed in carrying out the steps of my process. The process consists substantially in a series of successive applications of different liquid solutions, to the hides while suspended within the tank and on the bars 10, as required for the production of a leather product, and in the removal of the excess or used solutions before applying another solution to the hides for a different purpose.

The apparatus heretofore described is used in carrying out my process. The hides and skins are first relieved in suitable manner of all excessive fat and flesh, the tail, ears etc, and then the hides are attached to or supported on the bars 10 and introduced to the tank where they are supported, as on the hangers 11 and in position indicated in Fig. 2. When the hides are in proper position a circulation of water may be established through the hollow perforated supporting bar 10 and spraying pipe 38 to distribute the water over the hides. The working rollers 13 14 are also operated and caused to travel with a resilient pressure over the hides to which the water is being applied, for the purpose of removing previously applied salt, blood, etc., and in this manner the hides are softened and cleansed. The circulation of water is maintained by the pump 6, until upon test, the discharge of clear water through the test cock 8 indicates a cleansed condition of the hides. The collection of material secured by this cleansing step may be disposed of in suitable manner. By the action of the rollers the hides are worked on both surfaces, compressed, and relaxed while being subjected to the water bath, as well as in subsequently applied baths of different treating solutions.

After the cleansing step the water used is withdrawn from the circulation system and preparation is made for depilation of the hides which latter remain in the tank on their supports.

In the depilation of the hides hair-root solvents at approximately 90° F. are supplied to the circulation system and the hairs which are thus removed are conveyed by the circulation system from the tank and disposed of as desired. The liquid solution used in the depilation of the hides may include strong hydrates, sulphide of sodium solution, calcium solution, cæsium, or arsenic

mixed with lime. The liquid solution thus used causes the epidermis to distend and acts as a solvent for the removal of the hair roots. After the hairs have been removed from the hides the latter are washed by a flow of the liquid solution, or by a flow of water, and the washing material conveys the hair and other materials from the tank for proper distribution. Inasmuch as heavy and thick hides require a longer period of treatment for depilation than is required for lighter grades of hides, the duration of this depilatory step in the process may be varied to suit the existing conditions.

After the above indicated washing the hides as well as the interior walls of the tank are in a cleansed condition and the hides are now ready for a preliminary tanning step in the process.

Excessive heat stored in the compound may be removed through the venting device 3 or the top 2 of the container or tank may be removed for this purpose.

The hides are thus subjected to an application of the preliminary tanning solution, to both sides of the hides.

In the second tanning treatment the grain surfaces of the hides are subjected to a concentrated solution of dissolved metallic oxides, at a temperature and density to suit the nature of the compound, and dependent also upon the grade of the leather to be produced.

During the tanning step the tanning solution which is carried to and discharged from the container in the circulation system, may be purified and renovated from time to time, and replenished while the circulation is going on.

The tanning solution is circulated through the system until the hide tissues are completely metamorphosed and enveloped with tannin, and a leather product is produced without any relative shrinking of the hide tissues and which product is very pliable and evenly tanned.

The tanning solution used may be compounds of metallic salts, such as chrome

$$KCr_2(SO_4)_2 . 12H_2O$$

or the like which are applied lukewarm, have great penetrating powers for entering the hides. Vegetable and coniferous extracts are generally used with bulky hides and designed to produce a product of weight. These latter are applied at a lower temperature than the chrome because of their lower penetrating powers.

When the hides are sufficiently tanned, the superfluous tannin, metallic salts, solvents or chrome liquors are removed through the circulation system, and excess moisture may be removed from the tank and hides by ventilating the tank.

The hides are now ready for coloring, and a mordant having a chemical affinity for coloring matter and serving to fix the colors in dyeing is first applied to the hides. The mordant is composed of about 100 gallons of sumach liquor boiled together with 2½ pounds of picric acid and 15 pounds of green soap. This mordant solution when applied should have a density of about 2 Baumé and a temperature of about 90° F. Through the circulation system the mordant is introduced to the interior of the tank and circulated for say ten minutes over the surface of the hides. The mordant is circulated, strengthened, replenished, and used over and over again, as required. After the application of the mordant, it is withdrawn and the hides and skins are washed with a fresh supply of lukewarm water containing two per cent of oxalic acid, the water being passed through the circulation system and flowed over the hides and then withdrawn. The washed hides are now ready for dyeing through the application of a coloring medium which may consist of liquid extracts of the coniferous, vegetable, and aniline or numerous sulphur and acid dyes to a desired nuance. In this step of applying the dyes, consumption of the mordant and dyes is decreased and economy is insured by the even distribution of the dyes over the surface of the hides, and as only the required quantity of dye is absorbed by the hides, the excess material is recovered.

After the hides have been properly dyed, the bulk of the coloring matter is withdrawn, then the circulation system is utilized to furnish a supply of lukewarm water to the hides to remove excess coloring matter. The hides are then dehydrated, as by heating and ventilating the interior of the tank, during which time the pressure rollers are used to evacuate the excess material from the hides.

In the next step of fat-liquoring or impregnating the hides with fats and oils, the fat-liquor is applied to the hides through the circulation system, and comprises a liquid solution of 50% sulphonated oil mixed with refined linseed oil. The sulphonated oil used on the color stock must be entirely free from sulphuric acid, except in the manufacture of sole leather and belting leather where there can be a trace of acid present. A solution composed of pure sulphonated oil, with 10 parts of gelatine; 20 parts of degras; 2 to 5 parts of talcum; and water, is also applied by the brush rollers to the flesh side of the colored stock. After the proper duration of time the fat liquor is removed by the circulation system, and the hides are dried by ventilating the tank.

The hides may be bleached in the process, and the bleaching may be accomplished through the circulation system. The bleaching agent used may be a liquid solution com-

posed of 4 pounds sal soda to 100 gallons of water at 95° F., 5 pounds oxalic acid solution and one pint of commercial hydrofluoric acid. After the hides have been subjected to this bleaching solution, the latter is withdrawn, the tank is ventilated, and the hides are removed as a finished product.

Thus while contained and supported in the tank the hides have been subjected to successive steps in the process of treatment, without necessity for handling, and without the use of machinery except the working rollers within the tank.

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

1. The step in the art of treating folded hides which consists in supporting the hides in a container, separately injecting a liquid solution onto the inner sides of the folded hide and the outer sides of the folded hide, working the hide by mechanical action in the presence of the solution, and withdrawing the liquid solution from the container.

2. The method of tanning folded hides in a closed container which consists in supporting the hides in the container, ejecting a liquid solution on the inner and outer sides of the hides within the container working the hides by mechanical action, ejecting the solution from the container, and venting the container to remove excess moisture therefrom.

3. The method of treating folded hides within a container which consists in subjecting the inner and outer sides of the hides to a required amount of different treating materials in a series of successively applied liquid solutions to soften, clean, depilate, plump and tan the hides, mechanically working the hides, in the presence of the solutions and then drying the hides to produce a finished leather product.

4. The method of treating folded hides and skins within a closed container which consists in applying to the inner and outer sides of the hides a minimum amount of liquid agent as will be absorbed thereby, working the hides by mechanical action in the presence of the agent withdrawing the free flowing agent, and then venting the closed container.

5. The method of treating folded hides within a container which consists in subjecting the inner and outer sides of the hides to a minimum amount of media in a series of successively applied solutions as will be absorbed by the hides for tanning the same, mechanically working the hides in the presence of the media, and separately withdrawing said solutions, and finally drying the hides.

In testimony whereof, he has signed his name to this specification this 15th day of September, 1919.

CHARLES JOHN GLASEL.