(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 935 631 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
16.11.2016 Bulletin 2016/46

(21) Application number: **12829162.2**

(22) Date of filing: **28.12.2012**

(51) Int Cl.:
C14B 1/58 *(2006.01)* ***C14C 11/00*** *(2006.01)*

(86) International application number:
PCT/IB2012/057798

(87) International publication number:
WO 2014/096910 (26.06.2014 Gazette 2014/26)

(54) METHOD AND APPARATUS FOR DRYING HIDES DURING THE FINISHING PROCESS

VERFAHREN UND VORRICHTUNG ZUM TROCKNEN VON HÄUTEN WÄHREND DES FERTIGUNGSPROZESSES

PROCÉDÉ ET APPAREIL POUR SÉCHER DES PEAUX PENDANT LE PROCESSUS DE FINITION

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **19.12.2012 IT VI20120338**

(43) Date of publication of application:
28.10.2015 Bulletin 2015/44

(73) Proprietor: **Officine Di Cartigliano Spa**
36050 Cartigliano (VI) (IT)

(72) Inventor: **POLATO, Antonio**
I-36063 Marostica (VI) (IT)

(74) Representative: **Maroscia, Antonio**
Maroscia & Associati Srl
Piazza del Castello, 26
36100 Vicenza (IT)

(56) References cited:
EP-A2- 0 739 715
WO-A1-86/07389
WO-A1-90/05196
WO-A1-90/13671
WO-A1-2006/100055
WO-A1-2011/045666
US-A- 5 048 455

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 2 935 631 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the invention

[0001] The present invention generally finds application in the field of tanning and nonwoven (imitation leather) fabrics, and particularly relates to a method of forming crust leather by drying, during the finishing process.

[0002] In another aspect, the invention relates to an apparatus for drying hides (crust) that uses the method.

Background art

[0003] After the various tanning, re-tanning and dyeing treatments, hides are known to often exhibit surface defects that were naturally formed during the life of the animals (scratches due to goring, contact with barbed wire or thorns) or caused by poor leather preservation after flaying.

[0004] In these cases, the dried hides (crust) undergo a process typically known as finishing, whereby such defects are removed or made less visible, for better use of the hides.

[0005] Finishing may be a mechanical or chemical process. In chemical finishing, which is the one of interest herein, the hides are coated with generally liquid products, which are designed to form a grain side layer that may have various thicknesses or be elastic or tough according to the type of finishing and leather.

[0006] The finishing products may be selected, for instance, from the group of synthetic (acrylic, butadiene, polyurethane) resins or natural binders (caseins, albumins, protein-based film-forming agents, based on modified cellulose) possibly added with pigments, dyes, opacifiers, polishing agents, various auxiliary additives. These products are mixed with 20% to 40%, preferably 25% to 30% water, based on the total mass. The aqueous solution is deposited on the grain side of the hides and forms a film that is designed to intimately bind with the fibers, to become integral with the hide.

[0007] The finishing liquid may be applied essentially using three methods: spray, roller or curtain coating.

[0008] The spray coating method consists in applying finishing chemicals to the hide surface, in automatic spray lines where hides are laid on appropriate belt conveyors, and their surface is sprayed in tunnels or cabins by rotating or reciprocating guns (curtain coating machine).

[0009] The roller coating method is carried out in a roller coating unit, with rollers designed to transfer the substances to the hide surface. Particularly, the unit has a metal roller with a given pattern engraved thereon, which is dipped in the finishing liquid bath, and a blade, which is used to limit the amount of liquid being transferred.

[0010] The hide contacts the product-wetted roller and is supported by an opposed conveying roller. This will optimize the finishing process. A continuous, uniform and easily adjustable coating is obtained.

[0011] In both cases, a further layer of a fixing agent is typically deposited, for stabilization and preservation of the underlying finishing layer. This layer of fixing agent should also undergo drying in a hot air tunnel as described above.

[0012] The drying process has been typically carried out to date using an oven or a tunnel operating with infrared rays, catalytic gas and more often with hot air.

[0013] FIG. 1 shows a typical finishing plant R comprising two spray units R1 with two air drying tunnels T1, T2 downstream therefrom, between the two paint and fixing agent coating stations, and upstream from a chiller C and a staker K for imparting softness to the hides again. Hot air is conveyed into the tunnels T1, T2, using high-capacity compressors and blowers, with a capacity of thousands of cubic meters/hour.

[0014] While this type of drying apparatus affords some effectiveness, it still has the drawback of carrying dust and impurities, which are deposited on the hides and integrated in their surface, thereby reducing the quality of the finished hides.

[0015] The drying temperatures in these apparatus generally range from 80°C to 120°C.

[0016] One drawback of these prior art methods and plants consists in that the production of high hot air flow rates requires considerable energy costs.

[0017] A further drawback is that after the deposition of the finishing layer, the dried hides have a hot surface and cannot be easily handled and stacked. Therefore, completely dried hides shall be topically cooled using a cooling device, such as a cold air chiller, which has high power consumption.

[0018] Another drawback is that high temperature drying processes are not uniform and tend to after the "hand" of leather, i.e. make it more rigid and less soft than they were in the unfinished state.

[0019] Finally, any shrinking effect of the hot drying process will cause unevenness and some skrinkage in the hides, thereby leading to a significant reduction of the useful leather area, and to a reduction of the final inherent value of the treated hides.

From US5048455, on which is based the preamble of claim 1, a process and apparatus are known for finishing flexible material such as hides and leathers. In this process drying of the finishing products applied to the surface of the hides is carried out in a ultraviolet radiation oven as the finishing products comprise dyes and organic components with photoinitiators which are polymerizable only with ultraviolet radiations.

WO8607389 disposers a method and apparatus for conditioning and reducing the residual moisture of the products under treatment leathers, such as hides, furs and the like. The products under treatment are initially wet and are subjected to an electromagnetic field In the frequency band of the microwaves between 0.3GHz and 30GHZ combined with a depression to achieve a uniform distribution of residual moisture. These method and apparatus have no means to perform a finishing process

on the surface of the products, EP0739715 discloses a process for the embellishment of hides which provides the coupling of an elastic material film to a surface of the hides by exerting a pressure and drying it before the coupling.

Disclosure of the Invention

[0020] The object of the present invention is to obviate or at least alleviate the above drawbacks, by providing a method and an apparatus for finishing crust hides that is highly efficient and relatively cost-effective.

[0021] Another object of the Invention is to provide a finishing method with a drying that uses a lower temperature than prior art finishing methods.

[0022] A further object of the invention Is to provide a drying method that has a lower power consumption and minimizes the costs of the final product

[0023] Another object of the invention is to provide a drying method performed after finishing that maintains the useful area of the finished hides substantially unaltered.

[0024] Yet another object is to devise a drying method performed during finishing that does not harden hides and maintains the hand of the treated hides.

[0025] These and other objects, as better explalned hereafter, are fulfilled by a method of finishing dried hides as defined in claim 1.

With this combination of features, drying and the whole finishing process will have very low running costs. Particularly, power consumption will be about 1 electric kW per liter of extracted water.

[0026] Advantageously, with the drying method of the invention, hides will be heated to temperatures not exceeding 30°.

[0027] Furthermore, the drying process will be substantially uniform and require very little moisture extraction, thereby avoiding the infiltration of dust and other foreign matter.

[0028] Also, no cooling will be required downstream from drying, which will avoid the need for expensive cooling units, having high power consumption.

[0029] Finally, the hides will keep their hand unaltered with no significant loss of useful area.

[0030] In a further aspect, the invention relates to a plant for finishing dried, as defined in claim 6.

[0031] Advantageous embodiments of the invention are defined in accordance with the dependent claims.

Brief description of the drawings

[0032] Further features and advantages of the invention will become more apparent from the detailed description of a few preferred, non-exclusive embodiments of a method and plant of the invention, which are described as non-limiting examples with the help with the accompanying drawings in which:

FIG. 1 is a general view of a prior art finishing plant using hot air drying tunnels;

FIG. 2 is a perspective view of a finishing plant which incorporates drying apparatus of the invention;

Fig. 3 shows a side view of a detail of FIG. 2 in an enlarged scale;

FIG. 4 is a partially broken-away side view of the apparatus of FIG. 3;

FIG. 5 is a front view of the apparatus of FIG. 3;

FIG. 6 shows a block diagram of the drying method of the invention.

Detailed description of a preferred embodiment

[0033] Referring to the above figures, the drying plant of the invention, generally designated by numeral 1, Is designed to be part of a plant for finishing crust hides P, generally referenced R.

[0034] The finishing plant R comprises, as is known in the art, a first finishing unit R1, for depositing a first layer or film S' of a liquid finishing product on a surface of the hides P, on the grain side.

[0035] Namely, the first finishing unit R1 has an inlet section I for the hides P to be treated and an outlet section O for the treated hides.

[0036] A moving transfer surface, not shown, Is interposed between the inlet I and the outlet O, for automatically and continuously feeding the hides P in a predetermined direction V.

[0037] The finishing unit R1 may be of spray, roller or curtain coating type, as is known per se and not included in the scope of the present invention, for spraying or spreading the finishing solution on one face of the hides P being treated.

[0038] Thus, the rate of the finishing solution will range from 0,46 to 4,6 g/cm2.

[0039] In such plant, a second finishing unit R2 is provided, substantially identical to the first, for uniform application of a second layer S" of a liquid product on the first layer S', for stabilizing and protecting said first layer. Here, the rate of the fixing solution will range from 0,3 to 2,3 g/cm2.

[0040] According to the invention, a first drying apparatus 1 of the invention Is placed downstream from the first finishing unit R1, and has a frame that supports a shielding tunnel 2 having an inlet 3 and an outlet 4.

[0041] A moving transfer surface 5 slides in the tunnel 2, for feeding hides lying thereon in the direction V.

[0042] Conveniently, the moving transfer surface 5 may consist of a belt conveyor or annular wires subtended by end rollers 6, 7, one of which is motorized, for automatic feeding of the hides P.

[0043] An electromagnetic wave radiating antenna, irradiating waves in the RF range, generally referenced 8, is placed in the shielding tunnel 2 and is designed to irradiate the surface of the hides P to be dried.

[0044] The radiating antenna 8 essentially comprises a series of upper electrodes 9 and a series of lower elec-

trodes 10 located on each side of the belt conveyor 5 to irradiate the opposite surfaces of the hides P.

[0045] Suitably, the upper electrodes 9 and the lower electrodes 10 have such a size as to ensure substantially complete drying of the first finishing layer S'.

[0046] The electrodes 9, 10 are connected to a high frequency voltage and current generator 11. as is known per se and within the reach of the skilled person, which is controlled by an inverter 12 or by mechanical electrode adjustment 12 located in a cabinet 13, which will allow control of the supply voltage and current to the electrodes of the radiating antenna 8.

[0047] Particularly, the radiating antenna 8 will be adjusted to ensure extraction of at least an amount of liquid ranging from 0,7 to 3,1 g/cm2.

[0048] Conveniently, a second drying apparatus 1', substantially identical to the first 1 is located downstream from the second finishing unit R2, and is adjusted to ensure extraction of at least an amount of liquid ranging from 0.4 to 4,6 g/cm2.

[0049] With this arrangement, the drying costs will be dramatically reduced as compared with those of currently available IR ray or hot air plants.

[0050] Since electromagnetic waves are irradiated at ambient temperature, with no additional heat application, the final temperature of hides does not exceed 40°C, and is preferably lower than 30°C.

[0051] The low temperature of dried hides will allow immediate handling and stacking thereof without allowing them to cool. Also, this will avoid the use of cold air chillers, which have high costs and maintenance requirements, downstream from the drying units.

[0052] Furthermore, the finishing liquids are known to be aqueous solutions of organic and pigmenting products, representing about 20% to 40%, preferably about 25% to 30% based on the total weight of the solution. The organic component of the finishing layer deposited on the hide is almost instantaneously dried and cross-linked, and forms some sort of impermeable film on the grain side. Therefore, the interfibrillar water molecules cannot come out of the grain side, due to the presence of the impermeable film, and are forced to penetrate the leather fibers in the downward direction, to come out of the flesh side, where not impermeable barrier exists. Such penetration actually provides a one-way pumping effect toward the side opposite to the finishing side. Such one-way pumping of water molecules was surprisingly found to open out the fibers and to impart superior softness to the hide, as well as a hand that avoids crutch staking.

[0053] Since no hot air is used, power consumption will be greatly reduced, due to the lack of blowers and heating steam. Furthermore, hides will not be contaminated with dust or foreign matters carried in the tunnel by the forced air supply.

[0054] The overall power consumption will be about 1 electric kW per liter of extracted water.

[0055] Also, the lack of strong thermal stresses at relatively high temperatures, up to 120°C, will prevent hides from drying out or reduce their softness or hand feel.

[0056] Finally, but not less importantly, the lack of abrupt temperature changes as a whole and through the thickness of hides will prevent reductions of useful area of leather, which would involve a reduction of the inherent value and sale price of hides.

[0057] As a result, the drying apparatus 1 of the invention may be used with any existing finishing plant, using the belt conveyors 6 of the finishing plant as a moving transfer surface, and placing the pairs of electrodes of the first 12 and second 13 drying units on each side of the common belt conveyor 6.

[0058] FIG. 6 shows a block diagram of the drying method of the invention, when used with a per-se known finishing process.

[0059] The method comprises at least one first step a) of substantially evenly applying a first layer S' of a finishing product solution on one surface of the hides.

[0060] The first step a) is followed by at least one second step b) of drying the first layer S' of the liquid finishing composition, an optional third step c) of evenly distributing a second layer S" of a fixing agent on the first layer S' for protection and stabilization of this latter, and a fourth step d) of drying the second fixation layer S".

[0061] Both drying steps b) and d) are carried out by irradiating the wet portion of the hides P with an alternating electromagnetic field whose frequency is within the RF range, for substantially complete drying of said first layer S' and said second layer S".

[0062] The method and plant of the invention are susceptible to a number of changes or variants, within the inventive concept disclosed in the appended claims. All the details thereof may be replaced by other technically equivalent parts, and the materials may vary depending on different needs, without departure from the scope of the invention.

[0063] While the method and plant have been described with particular reference to the accompanying figures, the numerals referred to in the disclosure and claims are only used for the sake of a better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

Claims

1. A method of finishing hides (P), each hide having opposite sides, namely a grain side and a flesh side and leather fibers interposed therebetween, the method comprising:

   - at least one first step a) of applying a first layer (S') of a finishing liquid composition on one side of the hides;
   - a second step b) of drying said first layer (S') of a liquid finishing composition;
   - an optional third step c) of applying a second

layer (S") of a fixing solution on said first layer (S') for protection and stabilization thereof;

characterized in that said finishing liquid composition is an aqueous solution of organic components, said first layer (S') of said finishing liquid composition being deposited on the grain side of the hides (P), said second step b) of drying being carried out by irradiating said first layer (S') with an electro-magnetic oscillating field with frequency comprised in the range of the radio-frequency (RF) to provide a substantially complete drying of said first layer (S'), said second step b) of drying being carried out to polymerize almost instantaneously the organic components of the aqueous solution of said first layer (S') to form on the grain side of the hides an impermeable barrier in such a manner that the Interfibrillar water molecules are forced to come out from the flash side of the hides thereby opening out the leather fibers and imparting to the hides a higher softness.

2. Method as claimed in claim 1, wherein a fourth step d) of drying is provided for drying said second fixation layer (S") layered with said third application step c).

3. Method as claimed in claim 2, wherein said fourth step d) of drying is carried out by irradiating said second fixation layer (S") with an electro-magnetic oscillating field with frequency comprised In the range of the radio-frequency (RF) similar to that of said second step b) of drying.

4. Method as claimed in claim 2. wherein said second step b) of drying and said fourth step d) of drying are carried out on the hides (P) at ambient temperature without hot air flow in such a manner that the treated hides are maintained at temperature substantially lower than 30°C and are not contaminated with dust or foreign matters.

5. Method as claimed in claim 1, wherein the specific energy of said oscillating electro-magnetic field in the RF range for each liter of vaporized liquid is between 0.5 and 2 KW/l.

6. A plant (R) for finishing dried crusted hides (P), comprising a first finishing unit (R1) for evenly applying on at least one surface of the hides (P) a first layer (S') of a finishing liquid composition, a second finishing unit (R2) for evenly applying on said first layer (S') a second layer (S") of a fixing solution for stabilization and protection, a first drying apparatus (1) downstream of said first finishing unit (R1) designed to dry in a substantially complete manner said first layer (S'), a second drying apparatus (1') designed to dry in a substantially complete manner said second layer (S"), wherein each of said first (1) and said second (1') drying apparatus comprises a shielding tunnel (2) internally of which are located a movable transfer surface (5) for advancement of the hides along a predetermined direction (V), wherein said finishing liquid composition is an aqueous solution of organic components, **characterized in that** each of said first (1) and said second drying apparatus (1') comprises an emitting antenna (8) for radiating electro-magnetic waves in the RF range directed towards the hide surface (P), said first finishing unit (R1) being adapted to evenly apply said first layer (s') on the grain side of the hides, said first drying apparatus (1) being adapted to polymerize almost instantaneously the organic components of said first layer (S') to form on said grain side of the hides an impermeable barrier In such a manner that the interfibrillar water molecules are forced to come out from the flesh side of the hides thereby opening out the feather fibers and imparting to the hides a higher softness.

7. Plant as claimed in claim 8. wherein said radiating antenna (8) for emitting electro-magnetic waves in the RF range comprises a series of upper electrodes (9) and a series of lower counter-electrodes (10) supplied by a generator of high frequency oscillating tension connected to a triode automatically controlled by an inverter (12) or manually adjusted.

8. Plant as claimed in claim 7. wherein said inverter (12) is adjusted to supply said radiating antenna (8) to dry a quantity of liquid at least comprised between 0,7 and 3,1 g/cm^2.

9. Plant as claimed in claim 7, wherein said inverter (12) is adjusted to supply said radiating antenna (8) to dry a quantity of liquid at least comprised between 0,46 and 4,6 g/cm^2.

10. Plant as claimed in claim 6, wherein said first drying apparatus (1) and said second drying apparatus (1') are functionally independent form each other and are connected to respective generators of electromagnetic oscillating fields with frequency proximate to 24 MHz and with specific power consumption comprised between 0,5 and 2 KW/l of dried liquid.

Patentansprüche

1. Ein Verfahren zur Fertigung von Häuten (P), wobei jede Haut gegenüber liegende Seiten aufweist, nämlich eine Haarseite und eine Fleischseite und Lederfasern, die dazwischen angeordnet sind, wobei das Verfahren umfasst:

- mindestens einen ersten Schritt a) des Anwendens einer ersten Schicht (S') einer fertig stellenden, flüssigen Zusammensetzung auf einer Seite der Häute,

- einen zweiten Schritt b) des Trocknens der ersten Schicht (S') einer flüssigen, fertig stellenden Zusammensetzung,
- einen möglichen dritten Schritt c) des Anwendens einer zweiten Schicht (S") einer Fixierlösung auf der ersten Schicht (S') zu deren Schutz und Stabilisierung,

dadurch gekennzeichnet, dass die fertig stellende, flüssige Zusammensetzung eine wässrige Lösung aus organischen Bestandteilen ist, die erste Schicht (S') der fertig stellenden, flüssigen Zusammensetzung abgegeben wird auf die Haarseite der Häute (P), der zweite Schritt b) des Trocknens ausgeführt wird mittels Bestrahlen der ersten Schicht (S') mit einem elektromagnetischen, schwingenden Feld mit Frequenzen, die in dem Bereich der Radiofrequenzen (RF) sind, um ein im Wesentlichen vollständiges Trocknen der ersten Schicht (S') zu erreichen, der zweite Schritt b) des Trocknens ausgeführt wird, um beinahe unmittelbar die organischen Bestandteile der wässrigen Lösung der ersten Schicht (S') zu polymerisieren, um auf der Haarseite der Häute eine undurchlässige Barriere zu bilden auf eine Weise, dass die interfibrillaren Wassermoleküle gezwungen sind aus der Fleischseite der Häute aus zu treten, um so die Lederfasern zu öffnen und den Häuten eine erhöhte Weichheit zu vermitteln.

2. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet, dass** ein vierter Schritt d) des Trocknens vorgesehen ist zum Trocknen der zweiten Fixierschicht (S"), die geschichtet wird mit dem dritten Anwendungsschritt c).

3. Verfahren gemäß Anspruch 2, **dadurch gekennzeichnet, dass** der vierte Schritt d) des Trocknens durchgeführt wird mittels bestrahlen der zweiten Fixierschicht (S") mit einem elektromagnetischen, schwingenden Feld mit Frequenzen, die in dem Bereich der Radiofrequenzen (RF) sind, ähnlich zu dem des zweiten Schritts b) des Trocknens.

4. Verfahren gemäß Anspruch 2, **dadurch gekennzeichnet, dass** dass der zweite Schritt b) des Trocknens und der vierte Schritt d) des Trocknens durchgeführt werden an den Häuten (P) bei Umgebungstemperatur ohne Heißluft-Strömung auf eine solche Weise, dass die behandelten Häute bei einer Temperatur im Wesentlichen von weniger als 30° C gehalten werden und nicht mit Staub oder fremden Substanzen beaufschlagt werden.

5. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die spezifische Energie des elektromagnetischen, schwingenden Felds im RF Bereich für jeden Liter an verdampfter Flüssigkeit zwischen 0,5 und 2 KW/l ist.

6. Eine Anlage (R) zur Fertigung getrockneter, verkrusteter Häute (P) mit einer ersten Fertigungseinheit (R1) zum gleichmäßigen Beaufschlagen mindestens einer Oberfläche der Häute (P) mit einer ersten Schicht (S') einer fertig stellenden, flüssigen Zusammensetzung, einer zweiten Fertigungseinheit (R2) zum gleichmäßigen Beaufschlagen der ersten Schicht (S') mit einer zweiten Schicht (S") einer Fixierlösung zur Stabilisierung und zum Schutz, einer ersten Trocknungsvorrichtung (1) stromabwärts der ersten Fertigungseinheit (R1), die ausgelegt ist zum Trocknen der ersten Schicht (S') auf eine im Wesentlichen vollständige Weise, einer zweiten Trocknungsvorrichtung (1'), die ausgelegt ist zum Trocknen der zweiten Schicht (S") auf eine im Wesentlichen vollständige Weise, wobei jeder der ersten (1) und der zweiten Fertigungsvorrichtungen (1') einen abschirmenden Tunnel (2) aufweist, innerhalb dessen eine bewegliche Übertragsfläche (5) angeordnet ist zum Fördern der Häute entlang einer vorbestimmten Richtung (V), wobei die fertig stellende, flüssige Zusammensetzung eine wässrige Lösung aus organischen Bestandteilen ist, **dadurch gekennzeichnet, dass** jede der ersten (1) und der zweiten Fertigungsvorrichtungen (1') eine Sendeantenne (8) aufweist zum Abstrahlen elektromagnetischer Wellen im RF Bereich, die auf die Hautflächen (P) gerichtet sind, wobei die erste Fertigungseinheit (R1) ausgelegt ist, die erste Schicht (S') gleichmäßig auf die Haarseite der Häute aufzutragen, und die erste Trocknungsvorrichtung (1) ausgelegt ist, um beinahe unmittelbar die organischen Bestandteile der ersten Schicht (S') zu polymerisieren, um auf der Haarseite der Häute eine undurchlässige Barriere zu bilden auf eine Weise, dass die interfibrillaren Wassermoleküle gezwungen sind, aus der Fleischseite der Häute aus zu treten, um so die Lederfasern zu öffnen und den Häuten eine erhöhte Weichheit zu vermitteln.

7. Anlage gemäß Anspruch 6, **dadurch gekennzeichnet, dass** die Sendeantenne (8) zum Abstrahlen elektromagnetischer Wellen im RF Bereich eine Reihe oberer Elektroden (9) und eine Reihe unterer Gegen-Elektroden (10) aufweist, die von einem Generator mit hoher Frequenz schwingender Spannung versorgt werden, der an eine Triode angeschlossen ist, die automatisch gesteuert ist von einem Inverter (12) oder per Hand eingestellt ist.

8. Anlage gemäß Anspruch 7, **dadurch gekennzeichnet, dass** der Inverter (12) eingestellt ist, um die Sendeantenne (8) in die Lage zu versetzen, eine Menge an Flüssigkeit zu trocknen, die mindestens zwischen 0,7 und 3,1 g/cm^2 ist.

9. Anlage gemäß Anspruch 7, **dadurch gekennzeichnet, dass** der Inverter (12) eingestellt ist, um die Sen-

deantenne (8) in die Lage zu versetzen, eine Menge an Flüssigkeit zu trocknen, die mindestens zwischen 0,46 und 4,6 g/cm^2 ist

10. Anlage gemäß Anspruch 6, **dadurch gekennzeichnet, dass** die erste Trocknungsvorrichtung (1) und die zweite Trocknungsvorrichtung (1') im Betrieb unabhängig von einander sind und jeweils mit Generatoren elektromagnetisch, schwingender Felder mit Frequenzen nahe bei 24 MHz und mit einem spezifischen Leistungsverbrauch zwischen 0,5 und 2 KW/l getrockneter Flüssigkeit verbunden sind.

Revendications

1. Procédé de corroyage de peaux (P), chaque peau ayant des côtés opposés, en particulier un côté cuir et un côté chair, et des fibres de cuir interposés entre ceux-ci, le procédé comprenant les étapes suivantes :

- au moins une première étape a) d'application d'un première couche (S') d'une composition liquide de corroyage sur un côté des peaux ;
- une deuxième étape b) de séchage de ladite première couche (S') d'une composition liquide de corroyage ;
- une troisième étape optionnelle c) d'application d'une deuxième couche (S") d'une solution de corroyage sur ladite première couche (S') pour la protection et la stabilisation de celle-ci ;

caractérisé en ce que ladite composition liquide de corroyage est une solution aqueuse de composants organiques, ladite première couche (S') de ladite composition liquide de corroyage étant déposée sur le côté cuir des peaux (P), ladite deuxième étape b) de séchage étant effectuée par exposition de ladite première couche (S') à un champ électromagnétique oscillant présentant une fréquence comprise dans la gamme des radio-fréquences (RF) pour obtenir un séchage sensiblement complet de ladite première couche (S'), ladite seconde étape b) de séchage étant effectuée pour polymériser presque instantanément les composants organiques de la solution aqueuse de ladite première couche (S') pour former une barrière imperméable sur le côté cuir des peaux, de manière que les molécules d'eau interfibrillaires soient forcées de sortir du côté chair des peaux, et à écarter de cette façon les fibres du cuir, et à rendre ainsi les peaux plus souples.

2. Procédé selon la revendication 1, dans lequel une quatrième étape d) de séchage est prévue, pour sécher ladite deuxième couche de fixage (S") appliquée dans ladite troisième étape d'application c).

3. Procédé selon la revendication 2, dans laquelle ladite quatrième étape d) de séchage est effectuée par exposition de ladite deuxième couche de fixage (S") à un champ électromagnétique oscillant présentant une fréquence comprise dans la gamme des radio-fréquences (RF), de façon similaire à la deuxième étape b) de séchage.

4. Procédé selon la revendication 2, dans lequel ladite deuxième étape b) de séchage et ladite quatrième étape d) de séchage sont effectuées sur les peaux (P) à température ambiante sans aucun jet d'air chaud, de manière que les peaux traitées soient maintenues à une température sensiblement inférieure à 30° et ne soient pas contaminées par la poussière ou les impuretés.

5. Procédé selon la revendication 1, dans lequel l'énergie spécifique dudit champ électromagnétique oscillant dans la gamme RF pour chaque litre de liquide vaporisé est comprise entre 0,5 et 2 KW/l.

6. Installation (R) de corroyage de peaux séchées en croûte (P) comprenant une première unité de corroyage (R1) pour l'application uniforme sur au moins une surface des peaux (P) d'une première couche (S') d'une composition liquide de corroyage, une deuxième unité de corroyage (R2) pour l'application uniforme sur ladite première couche (S') d'une deuxième couche (S") d'une solution de fixage ayant une fonction de stabilisation et de protection, un premier appareil de séchage (1) en aval de ladite première unité de corroyage (R1) conçu pour sécher de façon sensiblement complète ladite première couche (S'), un deuxième appareil de séchage (1') conçue pour sécher de façon sensiblement complète ladite deuxième couche (S"), dans laquelle chacun dudit premier (1) et dudit deuxième (1') appareils de séchage comprend un tunnel de protection (2) à l'intérieur duquel se trouve une surface de transfert mobile (5) destinée à faire avancer les peaux dans une direction prédéterminée (V), dans laquelle ladite composition liquide de corroyage est une solution aqueuse de composants organiques, **caractérisée en ce que** chacun dudit premier (1) et dudit deuxième (1') ') appareils de séchage comprend une antenne émettrice (8) pour l'irradiation d'ondes électromagnétiques dans la gamme RF, dirigées vers la surface de la peau (P), ladite première unité de corroyage(R1) étant conçue pour appliquer uniformément ladite première couche (S') sur le côté cuir des peaux, ledit premier appareil de séchage (1) étant conçu pour polymériser presque instantanément les composants organiques de ladite première couche (S') pour former une barrière imperméable sur le côté cuir des peaux, de manière que les molécules d'eau interfibrillaires soient forcées de sortir du côté chair des peaux, et à écarter de cette façon les fibres du

cuir, et à rendre ainsi les peaux plus souples.

7. Installation selon la revendication 8, dans laquelle ladite antenne émettrice (8) pour l'émission d'ondes électromagnétiques dans la gamme RF comprend une série d'électrodes supérieures (9) et une série de contre-électrodes inférieures (10) alimentés par un générateur de tension oscillante à haute fréquence connecté à un triode automatiquement contrôlé par un onduleur (12) ou réglé manuellement.

8. Installation selon la revendication 7, dans lequel ledit onduleur (12) est réglé pour alimenter ladite antenne rayonnante (8) pour sécher une quantité de liquide au moins compris entre 0,7 et 3,1 g/cm2.

9. Installation selon la revendication 7, dans lequel ledit onduleur (12) est réglé pour alimenter ladite antenne rayonnante (8) pour sécher une quantité de liquide au moins compris entre 0,46 et 4,6 g/cm2.

10. Installation selon la revendication 6, dans laquelle ledit premier appareil de séchage (1) et ledit deuxième appareil de séchage (1') sont fonctionnellement indépendants l'un de l'autre et sont connectés à des générateurs respectifs de champs électromagnétiques oscillants ayant une fréquence proche à 24 MHz et une consommation d'énergie spécifique comprise entre 0,5 and 2 KW/l de liquide séché.

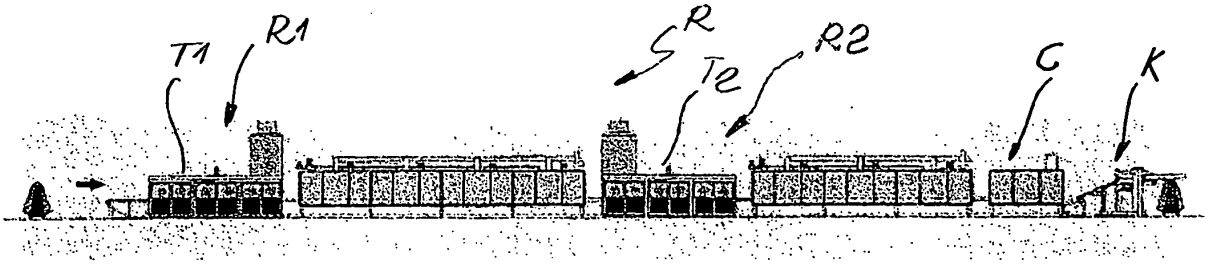


FIG. 1

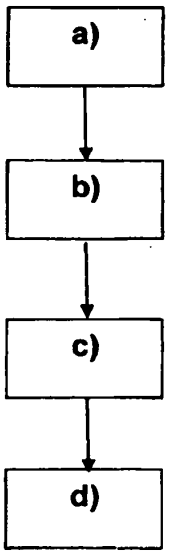


FIG. 6

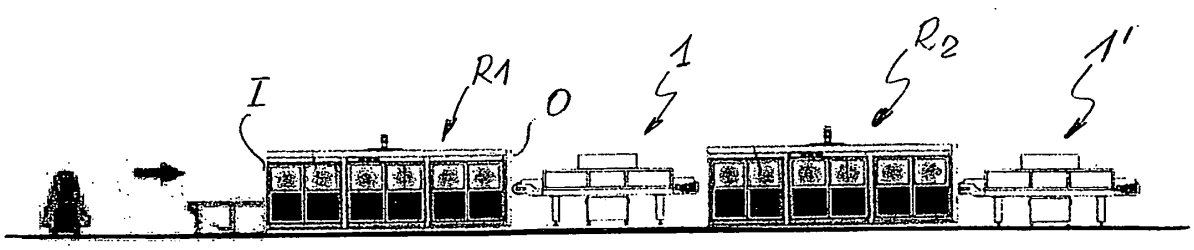


FIG. 2

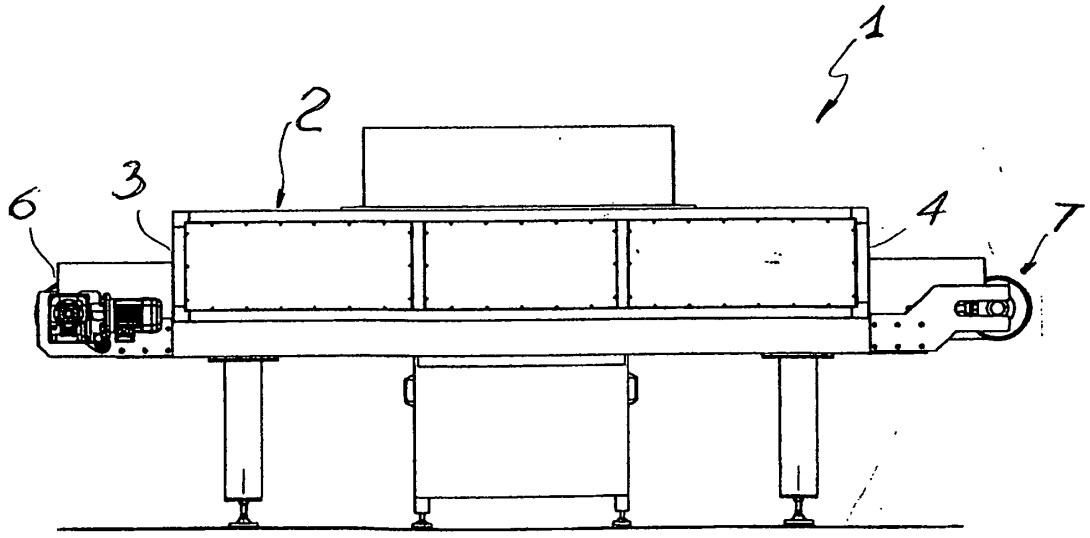


FIG. 3

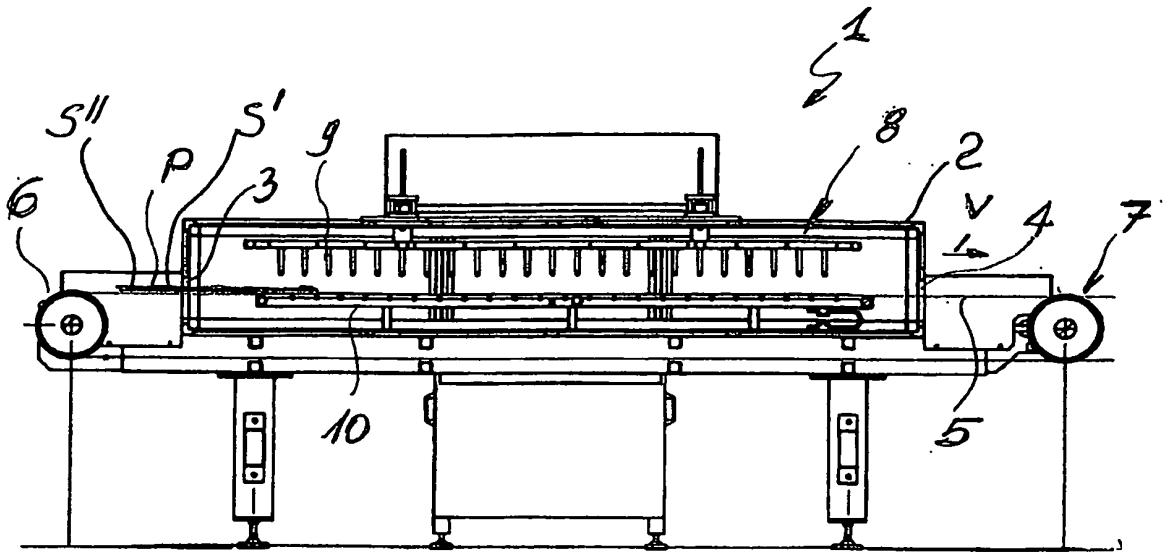


FIG. 4

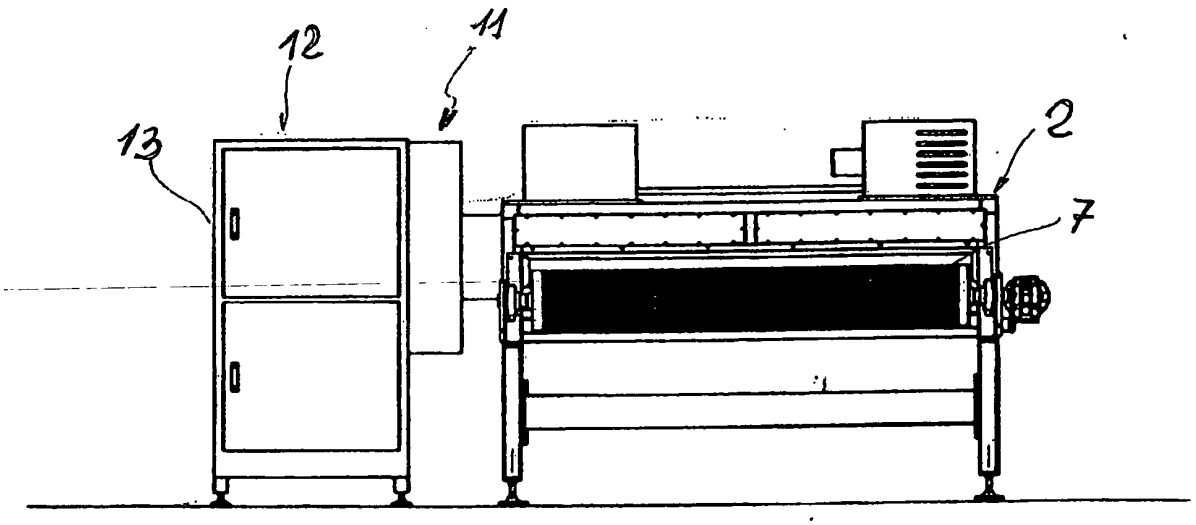


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 5048455 A **[0019]**
- WO 8607389 A **[0019]**
- EP 0739715 A **[0019]**