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(54) **Engraved cylinder for fitting to machines for rolled finishing of hides, artificial hides, fabric, synthetic materials and the like**

Gravierte Walze für Maschinen zur Bearbeitung von Häuten, Kunsthäuten, Gewebe,
Kunststoffmaterial und dergleichen

Cylindre gravé pour machines de finissage des peaux, peaux artificielles, tissus, matériaux
synthétiques et similaires

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DE-A- 3 927 365 **US-A- 4 763 370**

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Description

[0001] The present invention relates to the production of an engraved cylinder for use on machines designed for roller finishing of hides, artificial hides, fabric, synthetic materials and the like.

[0002] As it is known in carrying out the finishing operation in the field of the tannery industry, roller-machines are used in particular, more commonly known as dabbing machines or «roller-coaters», in which the hides are carried by a lower roll or a rubber mat and pressed against an opposing embossed roller consisting of an engraved cylinder, which ensures the application to the surface of the hide of a uniform film of liquid product, previously distributed over the engraved surface of the said cylinder by means of one or several scrapers.

[0003] The engraved cylinder can rotate in "synchro", that is to say in a manner in accordance with the direction of movement of the hide, or in "reverse", that is to say in a manner contrary to the aforesaid direction.

[0004] The complete success of the hide finishing operation depends on many factors, among which the regular feeding of the hide into the restricted zone, that is to say that comprised between the engraved cylinder and the underlying roller or conveyor mat, and depends above all on an optimum application to the hide of the liquid impregnation product.

[0005] The conveying and application action of the finishing liquid product is achieved by means of the honeycombs, which form the honeycomb embossed surface of the engraved cylinder.

[0006] The embossing pattern may be of the negative impression type, used mainly for processing-work in "synchro", where the quantity of product applied to the hide is dependant on the dimensions of the honeycomb, or of the positive impression type, used in the main for processing-work in "reverse", whereby the quantity of product to be applied to the hide, in addition to the dimensions of the honeycomb, also depends on the speed of rotation of the engraved cylinder.

[0007] Honeycombs with a negative impression are formed by small non-communicating cells, of a pyramidal or truncated-pyramidal shape with a base in the form of a square, hexagon or profile of whatsoever other polygon, of which the angle to the apex is variable between 30° and 120°.

[0008] The result of the coating of the product on the surface of the hide to be pigmented or coloured is associated with the quantity of product contained in each individual cell or honeycomb and by the spreading potential of the product itself.

[0009] Operationally, a large number of small honeycombs per unit of surface of the engraved cylinder allows an improved product application effect to be achieved in relation to the use of an engraved cylinder having a honeycomb of a larger type of dimensions.

[0010] Notwithstanding this, even with an embossed

surface having a high honeycomb density the processed hide will never result in a perfectly smooth and mirror-like surface.

[0011] Honeycombs with a positive impression consist of a series of inter-communicating channels, which demarcate projections located in uniform manner and present a continuous triangular shape or truncated-pyramid shape, with a square or rhomboid base, having an angle to the apex varying between 30° and 120°.

[0012] Such honeycombs with a positive impression have the advantage of being able to distribute a large quantity of product, which is directly proportional to the speed of rotation under "reverse" working conditions of the engraved cylinder, thus allowing a very smooth processed hide surface to be obtained, resulting from the spatula-like effect of the projections of the engraved roll.

[0013] The simpler configuration with a positive impression, is the type so-called "continuous helical groove".

[0014] In the present state of the art, the honeycombs with a pattern of positive impression having a continuous helical pattern, of essentially triangular cross-section, are produced with a helix angle sloping at 45°, that is to say with an axial pitch equal to the circumferential pitch, that value being the maximum possible used by the producers of engraved cylinders easier to produce to achieve satisfactory operation with the rolled finishing effect.

[0015] Such types of honeycombs, though having the advantage of extremely simple production, suffer two notable disadvantages:

- the feeding of the hide into the restricted zone is particularly difficult, making soft hides impossible to process;
- owing to the slope of the helix, the product to be applied tends to convey itself towards the end of the cylinder, thus causing its irregular distribution over the hides to be pigmented or coloured.

[0016] The use of engraved cylinders with positive impression honeycombs, in which the patterned face consists of intercrossing helical channels, inter-communicating in such a way as to form truncated pyramid projections with a square or hexagonal base, only eliminates the disadvantage of the lateral conveying of the product to be applied, but not the difficulty arising from the insertion of soft skins and in addition, when using high viscosity products, the patterning tends to mark the impression of the aforesaid projections on the surface of the hide or of the support to be pigmented.

[0017] Theoretical investigation of the behaviour of the fluid product to be spread over the hides and laboratory experimental tests have demonstrated however that positive results may be obtained with honeycombs having a helix slope with a minimum angle value of 50° up to a maximum angle value of 89°, in relation to the viscosity of the product to be applied, using low viscosity

products (0 cps) to products with a high viscosity (10,000 cps).

[0018] In particular, when working under "reverse" conditions with the above helix slope angles of the grooves any tendency to a knurling impression effect on the surface of the hide can be eliminated.

[0019] In addition, as shown by feasibility tests, as the helix slope value increases, approaching a maximum value of 89°, the insertion operation of the said hide into the restricted zone is facilitated and the negative effect of the lateral accumulation of the product on the cylinder is all the smaller.

[0020] In addition, under "synchro" working conditions, with helix slope values in excess of 50°, the release of the product from the base of the groove Pattern is facilitated and prevents the front border of the hide, the first to enter the restricted zone, from sticking to the patterned roller, owing to the adhesion effect caused by the fluid product and dropping only thereafter, giving rise to folds or curling, which damage or make the processed hide completely useless.

[0021] Finally, a high value of helix slope prevents air being entrained into the fluid mass of product to be distributed which, causing an absence of homogeneity of the aforesaid product, is the cause of irregular distribution and consequently does not allow a smooth and mirror-like surface to be achieved.

[0022] As an example of the state of art, it can be cited the document DE-A-3927365; however this device is provided with helical patterns belonging to two separate structures and so they intersect each other. This causes the formation of sharp corners that, when in contact with the objects to be worked, cause frictions, with resulting difficulties of advancing for the hides and creation of turbulences in the liquid products to be applied to the hides. Aim of the invention is to overcome these disadvantages with a simple device; this is achieved by means of a cylinder with the features of the characterizing part of the claim 1.

[0023] Such characteristics are illustrated by way of the appended drawings, provided for non-restrictive illustration purposes wherein:

- Fig.1 shows a patterned roller with the central part engraved with a helical pattern of grooves,
- Fig.2 represents a detailed view of the pattern, consisting of grooves, for which in the interest of clarity, the parameters are shown which determine the angle of slope of the helix in relation to the axis of the body of the cylinder.
- Fig.3 represents a detailed sectional view of the profile of the helical grooves according to line III-III in Fig. 2.

[0024] As may be seen from the illustrations the roller 1 has a cylindrical part bearing a patterned surface 2 achieved by way of the grooves 3, of triangular section and helical development.

[0025] The said grooves 3 are reciprocally separated and demarcated by the helical projections 4 of trapezoidal section and helical development.

[0026] In Fig.2 a detailed diagrammatic view of the pattern formed by the grooves is shown, and for greater clarity the parameters determining the helix angle of slope in relation to the axis of the body of the cylinder 1, the angle being determined by the following formula:

$$\alpha = \arctan \left(\frac{D \times \pi}{Pe} \right)$$

wherein:

Pe = p x z = the helix pitch, matching the space by which one point of the helix advances, parallel with the axis of the cylinder, during the course of one full rotation.

where

p = distance between two contiguous grooves of the helix.

z = number of helices contained in one helix pitch.

D = cylinder external diameter

D x π = external circumference of the cylinder

Claims

1. Engraved cylinder for fitting to machines for the rolled finishing of hides, artificial hides, fabric, synthetic materials and the like, of the type having an external engraved surface in such a manner as to form openings or grooves in a continuous helical pattern, **characterized in that** in the surface of said cylinder there are provided one or more continuous helical patterns of grooves that are reciprocally separated from each other and **in that** the angle of the helix slope of the said grooves in relation to the axis of the body of the cylinder is comprised between values of 50° and 89°, the said angle being determined by means of the formula:

$$\alpha = \arctan \left(\frac{D \times \pi}{Pe} \right)$$

wherein:

Pe = p x z = the helix pitch, matching the space by which one point of the helix advances, parallel with the axis of the cylinder, during the course of one full rotation.

where

p = distance between two contiguous grooves of the helix
 z = number of helices contained in one helix pitch.
 D = cylinder external diameter
 $D \times \pi$ = external circumference of the cylinder

2. Engraved cylinder according to claim 1, **characterized in that** the grooves form a patterned surface with a negative impression.

3. Engraved cylinder according to claim 1, **characterized in that** the grooves form a patterned surface with a positive impression.

4. Engraved cylinder according to claims 1 and 2, **characterized in that** the grooves with a negative impression consist of continuous channels, preferably of triangular or trapezoidal cross-section, with an angle to the apex comprised between 30° and 120°.

5. Engraved cylinder according to claims 1 and 3, **characterized in that** the grooves with a positive impression consist of a series of continuous channels in a helical pattern which demarcate projections located at regular intervals having a triangular or trapezoidal cross-section, with an angle to the apex variable between 30° and 120°.

Patentansprüche

1. Gravierte Walze für Maschinen zur Bearbeitung von Häuten, künstlichen Häuten, Gewebe, Kunststoffmaterial und dergleichen mit einer äußeren gravierten Oberfläche derart, dass Öffnungen oder Rillen in einem kontinuierlichen schraubenförmigen Muster gebildet sind, **dadurch gekennzeichnet, dass** in die Oberfläche der Walze ein oder mehrere kontinuierliche schraubenförmige Muster von Rillen eingebracht sind, welche wechselseitig voneinander getrennt sind, und dass der Steigungswinkel der Schraubenlinie der Rillen in Bezug auf die Achse des Walzenkörpers zwischen 50° und 89° beträgt, wobei der Winkel durch die Formel

$$\alpha = \arctan (D \times \pi / Pe)$$

bestimmt ist, worin:

Pe = p x z = Steigung der Schraubenlinie ist, die dem Abstand entspricht, um den sich ein Punkt der Schraubenlinie während der Ausführung einer vollen Drehung parallel zur Achse der Walze vorwärts bewegt;

wobei

p = Abstand zwischen zwei benachbarten Rillen der Schraubenlinie;
 z = Anzahl der Spiralen in einer Steigung der Schraubenlinie;
 D = Außendurchmesser der Walze; und
 $D \times \pi$ = äußerer Umfang der Walze ist.

2. Gravierte Walze nach Anspruch 1, **dadurch gekennzeichnet, dass** die Rillen eine gemusterte Oberfläche mit negativer Prägung bilden.

3. Gravierte Walze nach Anspruch 1, **dadurch gekennzeichnet, dass** die Rillen eine gemusterte Oberfläche mit positiver Prägung bilden.

4. Gravierte Walze nach Anspruch 1 und 2, **dadurch gekennzeichnet, dass** die Rillen mit negativer Prägung aus kontinuierlichen Kanälen, vorzugsweise mit dreieckigem oder Trapezquerschnitt, mit einem Spitzenwinkel zwischen 30° und 120° bestehen.

5. Gravierte Walze nach Anspruch 1 und 3, **dadurch gekennzeichnet, dass** die Rillen mit positiver Prägung aus einer Reihe kontinuierlicher Kanäle mit schraubenförmigem Muster bestehen, welche Vorsprünge begrenzen, die in regelmäßigen Abständen angeordnet sind und dreieckigen oder Trapezquerschnitt mit einem variablen Spitzenwinkel zwischen 30° und 120° besitzen.

Revendications

1. Cylindre gravé pour machines de finissage laminé des peaux, peaux artificielles, tissus, matériaux synthétiques et similaires, du type ayant une surface gravée externe de façon à former des ouvertures ou des rainures dans un motif hélicoïdal continu, **caractérisé en ce que** dans la surface dudit cylindre sont ménagés un ou plusieurs motifs hélicoïdaux continus de rainures qui sont réciproquement séparés les uns des autres et **en ce que** l'angle de l'inclinaison hélicoïdale desdites rainures par rapport à l'axe du corps du cylindre est compris entre des valeurs de 50° et 89°, ledit angle étant déterminé au moyen de la formule :

$$\alpha = \arctan \left(\frac{D \times \pi}{Pe} \right)$$

dans laquelle

Pe = p x z = le pas d'hélice, correspondant à l'espace selon lequel un point de l'hélice progresse, parallèle à l'axe du cylindre, pendant la course d'une rotation pleine.

dans laquelle

p = distance entre deux rainures contiguës de l'hélice

z = nombre d'hélices contenues dans un pas d'hélice. 5

D = diamètre externe du cylindre

$D \times \pi$ = circonférence externe du cylindre

2. Cylindre gravé selon la revendication 1, **caractérisé en ce que** les rainures forment une surface à motifs avec une impression négative. 10
3. Cylindre gravé selon la revendication 1, **caractérisé en ce que** les rainures forment une surface à motifs avec une impression positive. 15
4. Cylindre gravé selon les revendications 1 et 2, **caractérisé en ce que** les rainures avec une impression négative sont composées de canaux continus, de préférence de section transversale triangulaire ou trapézoïdale, avec un angle à la pointe compris entre 30° et 120°. 20
5. Cylindre gravé selon les revendications 1 et 3, **caractérisé en ce que** les rainures avec une impression positive sont composées d'une série de canaux continus dans un motif hélicoïdal qui délimitent les projections situées à des intervalles réguliers ayant une section transversale triangulaire ou trapézoïdale, avec un angle à la pointe variable compris entre 30° et 120°. 25

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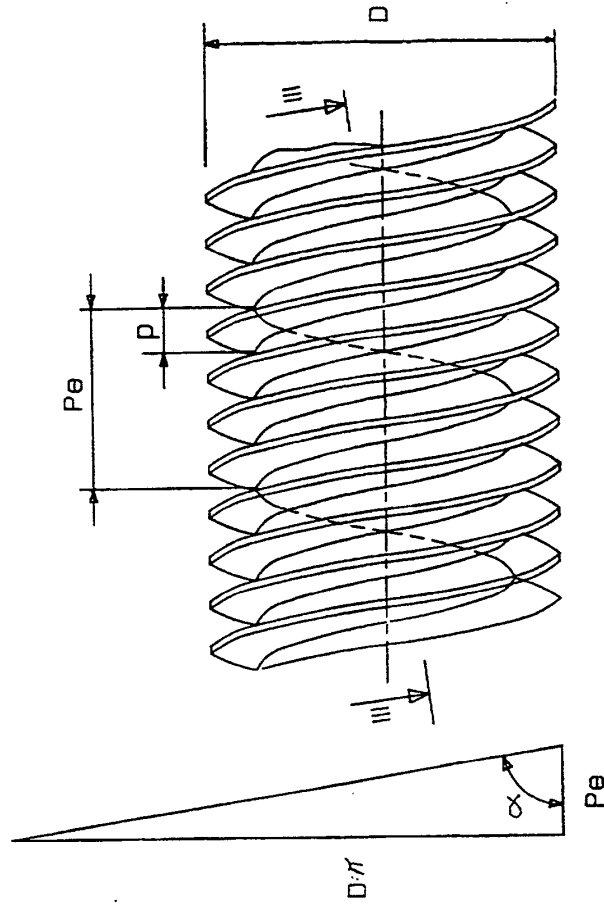
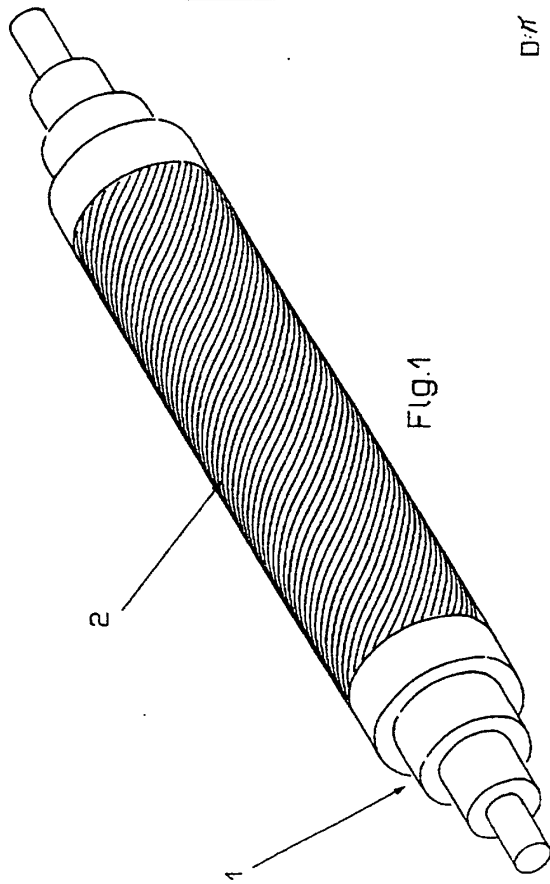


Fig. 2

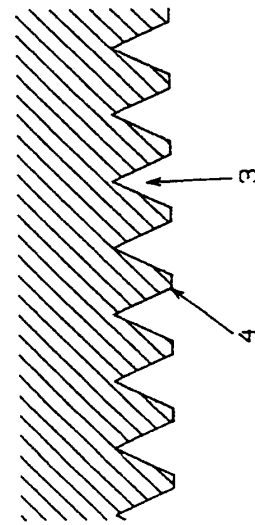


Fig. 3