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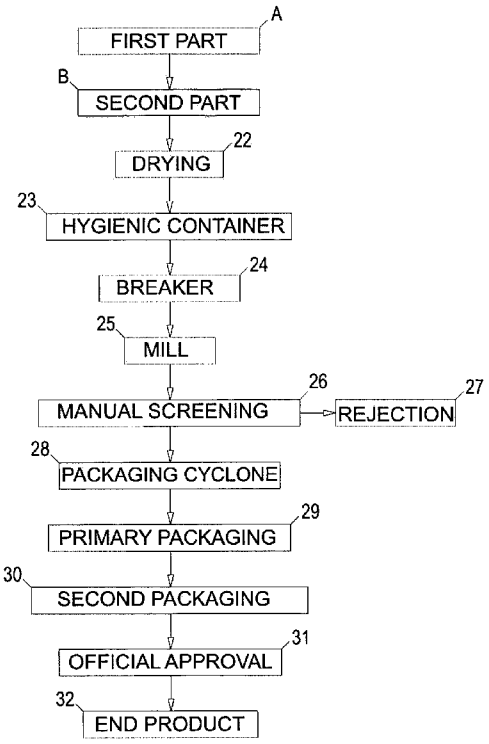
(54) Title: PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE

FIGURE 4



(57) Abstract: The present Patent of Invention refers to a process to extract the collagen protein from bovine hide which has the objective to reduce the extraction time of the collagen protein and increase the quality of the end product obtained. The process also obtains a reduction of costs and increase in productivity. The mentioned process to extract the collagen protein from bovine hide has a flow diagram to be rigorously followed, whose main stages are: kill the bovines (1); obtain the hide (2); remove the flesh (4); calcination (7); obtain the fiber (11); decalcination in a pressure vessel (12); dryer (17); obtention of the paste (21); drying (22); breaking (24); manual screening (26); primary packaging (29); secondary packaging (30); official approval (31); and end product (32). In this manner, one defines the present Patent of Invention as a well elaborated process of stages, divided into three main parts, which can be summarily explained as: obtention of the fiber; obtention of the paste; and finalization to package the collagen protein.

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Published:

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"PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE"

The present Patent of Invention refers to a PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE which has the objective to reduce the extraction time of the collagen protein and increase the quality of the end product obtained. THE PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE provides efficiency and agility in extraction, greater quality of the collagen obtained, cost reduction and increase in productivity.

Presently, the PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE is performed by extraction in acid or alkaline solutions or through enzymatic hydrolysis. In spite of the variation which exists between these methods, the objective of them all is to reach an end product with the best quality possible, in such a manner that the flow diagram to be followed is very well defined, so there is no loss of raw material, excessive costs, slow process and, mainly, damage to the end product.

The problem today, both in acid, as well as in alkaline solution extraction and enzymatic hydrolysis, is that, in general, they are not very well programmed, that is, the stages of the process take longer than necessary to be performed, generating excessive cost and a reduction in productivity.

As if this were not enough, one may still mention the low quality of the end product, since it is normal to partially break the large collagen molecule due to the excessive vigor in its handling and/or bad execution of the stages. This much undesired partial breaking of the large collagen molecule causes the end product obtained to be a degraded protein called gelatin and not the collagen protein. When this occurs, degradation is easily demonstrated by the brusque breaking of the viscosity, which can cause serious problems in manipulation and storage of the product.

Aiming to solve these inconveniences, the present Patent of Invention was developed, a PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE which aims to perform the extraction of the collagen protein in less time and at reduced cost, optimizing the process, so as to increase productivity and avoiding the undesired degradation of the collagen protein.

The mentioned PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE has a flow diagram to be rigorously followed, whose stages are: killing the bovines; obtaining the hide; sending it to the tannery; removing the flesh; eliminating the muscles; eliminating the fat; calcination with calcium hydroxide; elimination of the exoderm; separation of the endoderm; obtention of the fiber; decalcination in a pressure vessel, with water, plus acetic acid; transportation; discharging into a tank; selection; processing in a dryer; elimination of the excess water; cutting; milling; obtaining the paste; drying; depositing into a hygienic container; passage through a breaker; passage through a mill; manual screening; removing the larger portions; passage through the packaging cyclone; primary packaging; secondary packaging; awaiting official approval and end product.

The invention can be better understood through the following detailed description, in consonance with the figures enclosed, where:

FIGURE 1 represents a flow diagram of the PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE presenting, through key words, the three main parts of the process;

FIGURE 2 represents a flow diagram of the referred process, illustrating the key words of all the stages of the first part of the process;

FIGURE 3 represents a flow diagram of the same process, showing all the stages referring to the second part of the process, through its key words;

FIGURE 4 represents a flow diagram of the process to extract the collagen protein presenting all the stages of the third and last part of the process, through key words.

In relation to these figures, one can note that the PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE is started by performing the first (A) part of the process, which begins by killing healthy bovines (1) in slaughterhouses, to obtain the hide (2), which is the raw material sent to the tannery (3). At the tannery, the hide is submitted to the operation of removing the flesh (4) the muscles (5) and fat (6) located in a thin internal layer of the hide. Then there is the calcination (7) with calcium hydroxide – $Ca(OH)_2$ (8) – to raise the pH till close to 12, aiming to induce a swelling of the proteins, allowing the longitudinal division of the hide

into two parts. After the division, the exoderm (9) is eliminated and the endoderm (10), which is rich in glycine (approximately 24%) and lysine (approximately 3%), is used to obtain the fiber (11).

The second (B) part of the process starts with the decalcination of the fiber in a pressure vessel (12), under continuous rinsing with treated and filtered water, to which 0,12% of acetic acid is added – H_2O + CH_3COOH (13) – for approximately 9 hours, till reaching a pH close to neutral (pH = 7.0). Decalcination is monitored and included in the production and control sheets of the Hazard Analysis and Critical Control Points program - HACCP, equivalent to APPCC (*Análise de Perigos e Pontos Críticos de Controle*). Soon after, the pressure vessel is discharged directly into a vehicle with a stainless steel tank, entirely sealed against the weather, for transportation (14) with the health service documents till the plant, where it is unloaded into an also stainless steel tank (15), where selection is made (16), through sampling, supervised by quality control. Proceeding, it is sent to the dryer (17), which is a special press with sanitary quality rubber rollers, where the excess water is removed – excess H_2O (18). Then a stainless steel table is used to cut it into smaller portions (19); these portions are milled (20), in a special mill with 2mm disks, to obtain the paste (21).

A third (C) and last part of the process is started with drying (22) the paste in a special equipment (Drum Dryer), in 0,5 mm thick layers and at temperatures which vary between 120°C and 170°C, for from 30 to 45 seconds. The product, dried and pasteurized, is deposited in a hygienic container (23), and it immediately goes through the particle breaker (24), producing 6 mm particles which are sent to the mill (25). The particles then go through manual screening (26) so that rejection of larger particles is made possible (27). The ideal particles, which present the desired granule size distribution, are sent to the packaging cyclone (28) through sanitary quality piping, and then receive the primary packaging (29) a high density polyethylene bag, sealed with a safety plastic seal which identifies the lot. Then, the secondary packaging (30) is applied, in corrugated cartons, labeled and sealed with adhesive tape, palletized and enveloped in stretch plastic. Official approval is then awaited (31), furnished by the laboratory recognized by the Ministry of Agriculture and Sourcing - MAPA (*Ministério da Agricultura, Pecuária e Abastecimento*); this approval depends on the final analyses so

the product may be marketed abroad and is valid for 12 (twelve) months, when stored at ambient temperatures. We then have legally approved collagen protein, that is, the end product (32), which will be transported in a clean, adequate vehicle (truck or container) hygienically prepared for the transportation of food.

One concludes that the PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE produces a reduction in the time and costs of the process to extract the collagen protein, an increase in productivity and an increment in the quality of the end product obtained, through a well defined sequence of stages divided into three main parts.

CLAIMS

1st) "A PROCESS TO EXTRACT THE COLLAGEN PROTEIN FROM BOVINE HIDE", encompassing killing the bovines (1) to obtain the hide (2) transporting to the tannery (3) to remove the flesh (4) and muscles (5) and fat (6), characterized by presenting calcination (7) with $Ca(OH)_2$ (8), followed by the elimination of the exoderm (9); the endoderm (10), used to obtain the fiber (11), which will undergo decalcination in a pressure vessel (12) with the addition of H_2O + CH_3COOH (13) and later transportation (14), unloading into a tank (15), selection (16) and passage through the dryer (17) eliminating the excess H_2O (18), followed by cutting (19), milling (20) and obtention of the paste (21), which goes through drying (22), into a hygienic container (23), from there to a breaker (24), mill (25), manual screening (26) with rejection (27) of the larger particles; the ideal particles go to the packaging cyclone (28), receiving the primary packaging (29) and secondary packaging (30), to await official approval (31), obtaining the end product (32).

FIGURE 1

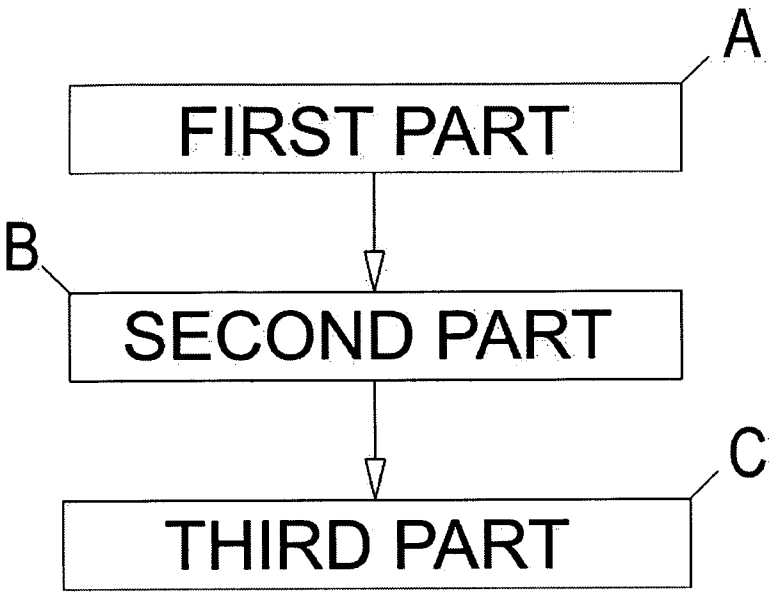


FIGURE 2

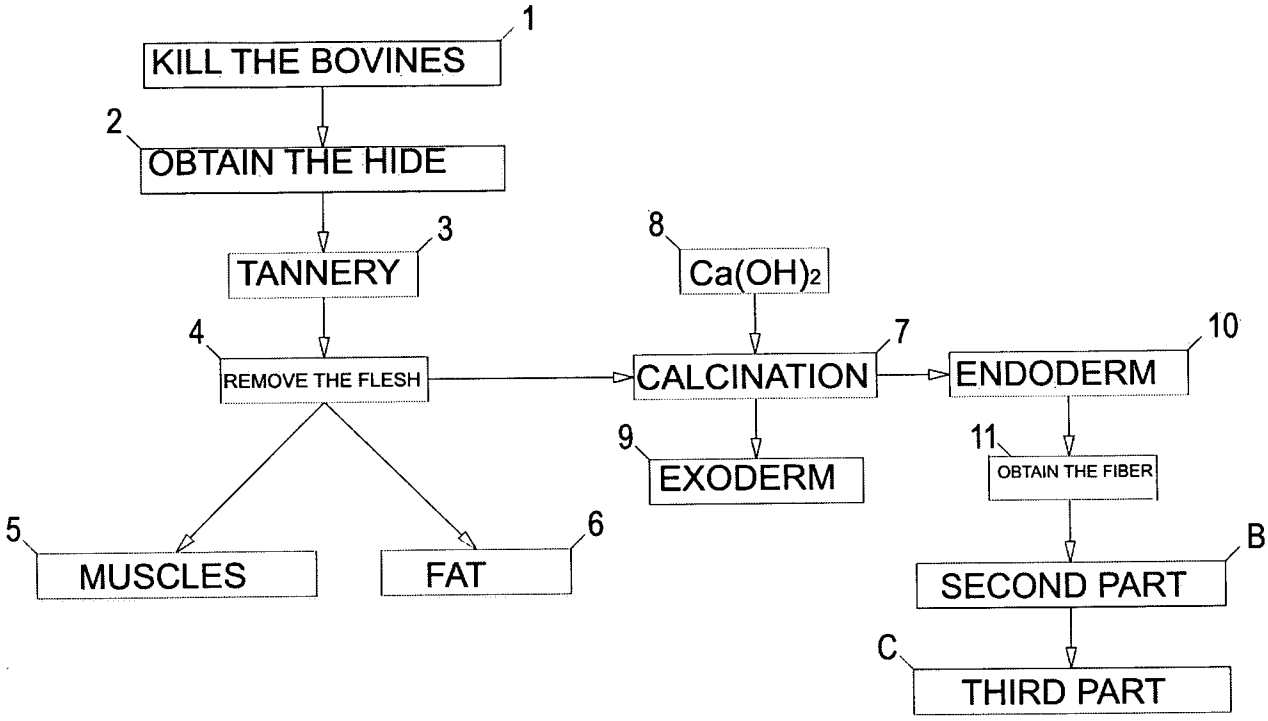

1
KILL THE BOVINES
2
OBTAIN THE HIDE
3
TANNERY
4
REMOVE THE FLESH
5
MUSCLES
6
FAT
8
Ca(OH)2
7
CALCINATION
9
EXODERM
10
ENDODERM
11
OBTAIN THE FIBER
B
SECOND PART
C
THIRD PART

FIGURE 3

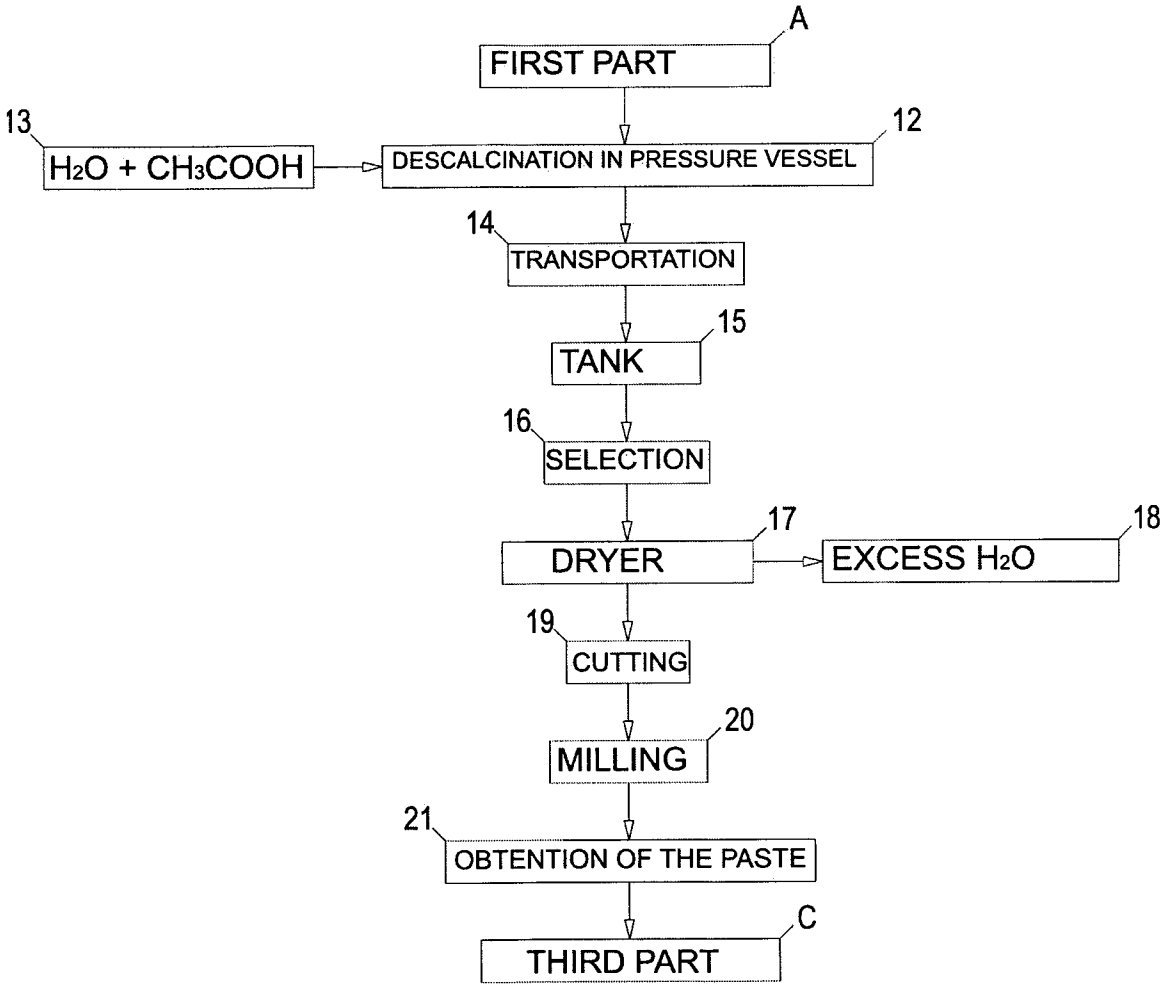
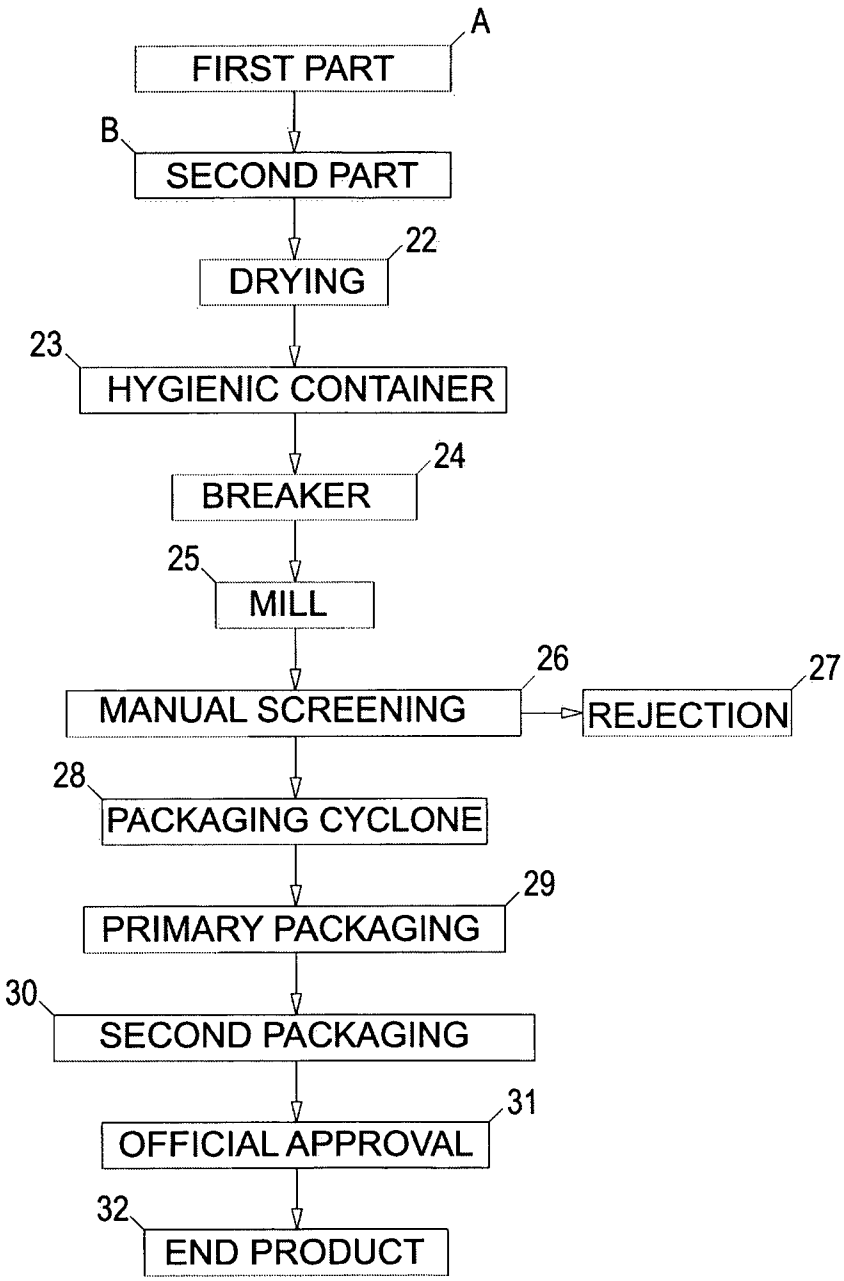

A
FIRST PART
13
H2O + CH3COOH
12
DESCALCINATION IN PRESSURE VESSEL
14
TRANSPORTATION
15
TANK
16
SELECTION
17
DRYER
18
EXCESS H2O
19
CUTTING
20
MILLING
21
OBTENTION OF THE PASTE
C
THIRD PART

FIGURE 4


A
FIRST PART
B
SECOND PART
22
DRYING
23
HYGIENIC CONTAINER
24
BREAKER
25
MILL
26
MANUAL SCREENING
27
REJECTION
28
PACKAGING CYCLONE
29
PRIMARY PACKAGING
30
SECOND PACKAGING
31
OFFICIAL APPROVAL
32
END PRODUCT

INTERNATIONAL SEARCH REPORT

International application N°
PCT/BR2010/000033

A. CLASSIFICATION OF SUBJECT MATTER

C07K 14/78 C07K 1/36 A23J 1/10 (IPC 2010.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C07K, A23J (IPC 2010.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, MEDLINE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claims N°
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A	CA 1096794 A1 (ROEHM GMBH) 03 March 1981 (1981-03-03)	---
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvius to a person skilled in the art

"&" document member ot the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 October 2010	09 11 10

Name and mailing address of the ISA/**BR**

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INTERNATIONAL SEARCH REPORT
Information on patent family members

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