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Santiago de Cali, Marzo 21 de 2002

SEÑORES
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES
SANTAFE DE BOGOTA D.C.

REFERENCIA. PROCESO GUBERNATIVO DE CONCESION Y REGISTRO DE LA
PATENTE DE INVENCION " PROCESO PARA LA ELABORACION DE UNA MASA DE
PLATANO O BANANO PREFRITA Y PRODUCTOS ASI OBTENIDOS "

SOLICITANTE JULIAN GALVIS MORA

APODERADOS SERGIO ROLANDO CABRERA MANRIQUEZ Y/O SERGIO ROBERTO
CABRERA TORRES Y/O MARIA CLAUDIA GORDILLO BERMEO

EXPEDIENTE No. 01028315.

SERGIO ROLANDO CABRERA MANRIQUEZ, mayor de edad, vecino de la Ciudad de
Cali, identificada con la Cedula de Extranjeria No. 205 990, expedida en Santafé de
Bogotá D.C. con domicilio en la Calle 11 No. 8-40 Oficina 305, Edificio Banco
Tequendama de la Ciudad de Cali, Abogado con Tarjeta Profesional No. 30.398 del
Ministerio de Justicia, obrando como Apoderado dentro del Proceso de la Referencia, y
estando dentro del término legal, teniendo en cuenta que la solicitud de la Referencia, fue
publicada en la Gaceta de la Propiedad Industrial No. 511 del 26 de Diciembre de 2001,
solicito y acompaño a usted lo siguiente

PRIMERO: Que se realice el Examen de Fondo de la solicitud de la Referencia, para que
se examine si la invencion es patentable todo de acuerdo al Artículo 45 de la Decision
488 de la Comision de la Comunidad Andina

SEGUNDO En virtud de lo anterior, acompaño recibo por valor de \$ 318 000.00, por
concepto de Examen de Patentabilidad de la Patente de Invención " PROCESO PARA
LA ELABORACIÓN DE UNA MASA DE PLATANO O BANANO PREFRITA Y
PRODUCTOS ASI OBTENIDOS

Anexo lo enunciado.

De la Division, Atentamente

DR. SERGIO ROLANDO CABRERA MANRIQUEZ
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SUPERINTENDENCIA Y COMERCIO
Ref: 01028315 - 00000002 Folios: 2
Fecha (MM) 2002-03-22 14:25:00
Tramite: 1 002 PATENTES D 1 00000000 536 PETICION
Remite: 2002 DIVISION DE NUEVAS CREACIONES

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DIVISION DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No 01-28315

**EL EXTRACTO DE LA PRESENTE SOLICITUD DE PATENTE DE INVENCION
FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No 511, DE
FECHA 26 DE DICIEMBRE DE 2001, EL TERMINO HABIL SEÑALADO POR LA
LEY EXPIRA EL 22 DE MARZO DE 2002.**

**NOTA Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de
publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el
examen de patentabilidad so pena de que la solicitud caiga en abandono, de
acuerdo con lo establecido en el Artículo 44 de la Decisión 488/2000**

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS

SI _____ NO X _____

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**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES**

2020

Bogotá, D C , 26 Junio 2007

Abogado

Sergio Rolando Cabrera Manriquez

(Apoderado)

Solicitante **Julian Galvis Mora**

ASUNTO

Radicación 01-28315

Trámite 002

Evento 001

Actuación 430

Oficio

Folios 012

- 00008406

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica

3 Documentos estudiados

3 1 Descripción Folios 4 a 7

3 2 Reivindicaciones Folios 8 a 9

3 3 Prioridad La solicitud no reivindica prioridad

4 Objeto de la invención

- Título de la solicitud "Proceso para la elaboración de una masa de plátano o banano prefrita y productos así obtenidos"

El objeto de la presente solicitud de patente de invención consiste en Reivindicaciones 1 a 5 Procesos para la elaboración de productos a base de una masa prefrita de plátano o banano maduro y de plátano verde Los productos obtenidos por estos procedimientos

La invención se ha desarrollado para obtener una masa a base de plátano o banano para obtención de productos de larga vida útil, con bajo costo, mayor rendimiento y aprovechamiento de la materia prima

Clasificación de la invención A23L 1/217 y A 23 P 1/02

3 De la solicitud de patente

En el capítulo reivindicativo se omitió la numeración de la última reivindicación la cual se refiere al producto obtenido según el procedimiento descrito en las reivindicaciones 3 y 4, la cual se tomó como la reivindicación 5 para el presente concepto

4 Unidad de invención (artículo 25 D 486)

- La solicitud se encuentra presentando dos procedimientos diferentes ya que los procedimientos descritos en las reivindicaciones 1 y 3 parten de materias primas diferentes y el procedimiento de la reivindicación 3 contiene una etapa diferente de igual forma algunas condiciones, con respecto al procedimiento presentado en la reivindicación 1 Por lo tanto, se presentan dos procedimientos diferentes los cuales no presentan un concepto común inventivo, por esta razón la solicitud no guarda unidad de invención

5. Determinación del Estado de la Técnica

Considerando que la fecha de presentación de la solicitud es 13 de Diciembre del 2001, se encontraron documentos del estado de la técnica relacionados, con fecha de publicación anterior a esta Tales documentos se presentan a continuación

Nº	Documento	Título	Fecha de Publicación
D1	US 4,242,366	Process for producing fried banana slices	1980-12-30
D2	US 4,834,996	Extruded starch snack foods and process	1989-05-30
D3	US 4,740,381	Process for preparing plantain and product thereof	1988-04-28

6 Análisis de patentabilidad (según requisito) (artículo 14 D486)

6.1 Nivel inventivo (artículo 18 D486)

Contenido de las reivindicaciones 1 a 5

-Proceso para la elaboración de productos a base de una masa prefrita de platano o banana maduro caracterizado porque se realiza partiendo de plátano plnton que tenga una madurez entre 25 y 32 grados brix y comprende las siguientes secuencias de etapas A) Se retira la cascara B) El plátano una vez pelado se somete a cocción o prefreido en aceite a una temperatura entre 70 C y 120 C, cuando éste flote en el aceite debe retirarse C) Una vez ha terminado la cocción el platano prefrito se deja en reposo por un tiempo no mayor a siete minutos, luego de lo cual esta listo para pasar al molino o extrusor obteniéndose así la masa de plátano o banana maduro, moldeable y con poco contenido de aceite D) La masa así obtenida y con un reposo no mayor a siete minutos se introduce en la tolva que alimenta el cilindro laminador, consistente en un cilindro rotatorio que ayudado de un troquel forma hojuelas de la masa alimentada

E) Las hojuelas de plátano o banano laminadas y moldeadas son deshidratadas luego hasta un contenido de humedad inferior a 7% en un tiempo inferior a cinco minutos preferiblemente no superior a dos minutos, este proceso de deshidratación es opcional. F) Después de la deshidratación las hojuelas se empacan en bolsas herméticamente selladas y dentro de cajas para su posterior fritura.

-Producto obtenido por el proceso anterior caracterizado porque se obtiene un producto semi elaborado de plátano o banano maduro, consistente en una hojuela, la cual después de la fritura da como resultado un producto completamente elaborado consistente en una hojuela crocante o alimento tipo snack, de color amarillo escaramelado y sabor dulce.

-Proceso para la elaboración de productos a base de una masa prerita de plátano verde caracterizado porque el proceso comprende las siguientes etapas:

A) Se retira la cáscara. B) El plátano se hidrata luego introduciéndolo en agua con solución desinfectante, ácido cítrico y/o una sal a una temperatura no inferior a 10 °C y no superior a 30 °C. El plátano verde inmediatamente es pelado debe sumergirse en la solución acuosa por un período mínimo de cuatro horas, pero no superior a 20 horas. C) El plátano hidratado se somete a cocción o prefreído en aceite a una temperatura entre 80 y 120 °C, cuando éste flote en el aceite indica que la evacuación de humedad se ha completado por lo tanto debe retirarse del aceite. Tiempo promedio cinco minutos. D) Una vez ha terminado la cocción del plátano prefreído se deja en reposo por un tiempo no mayor a siete minutos, luego de lo cual está listo para pasar al molino o extrusor obteniéndose así la masa de plátano. E) La masa así obtenida y con un reposo no mayor a siete minutos se porciona y por medio de una prensa hidráulica se comprime hasta formar una tela o lámina. F) Las porciones de la lámina de plátano formadas se dejan reposar sobre una malla metálica hasta que se evapore el agua superficial con ayuda de un ventilador. G) Luego las láminas son empaquetadas en bolsas, se sellan y se llevan a congelación, luego de lo cual se almacenan en congelación.

- Las láminas de plátano verde pueden ser deshidratadas en forma rápida, previa realización de múltiples perforaciones en la tela o en la lámina de manera que el producto no requiera congelación.

En los documentos presentados como antecedentes se encontraron las siguientes características: la anterioridad D1 presenta un proceso para producir un producto de plátano seco teniendo una textura crujiente y buena estabilidad al almacenamiento. Dentro del procedimiento se presentan los siguientes pasos. Los plátanos son pelados, luego la pulpa del plátano se corta de la forma deseada preferiblemente con cuchillo de acero inoxidable. El corte se realiza preferiblemente paralelamente al eje longitudinal. Los cortes del plátano se colocan en la canastilla de un freidor. Dicho freidor posee un dispositivo para remover el exceso de aceite en las tajadas de plátano fritas. Se debe trabajar a temperaturas de freído que se encuentren por encima de 75 °C ya que a temperatura por debajo de este valor la viscosidad del aceite incrementa y largos períodos de tiempo son requeridos para deshidratar lo que ocasiona que el contenido de aceite en el producto seco se incremente.

En la anterioridad D2 se presenta un proceso continuo para preparar un snack con bajo contenido de grasa. Los ingredientes de la composición que se somete a dicho procedimiento son agua y almidón. El método de preparación del producto involucra mezcla y calentamiento de la composición en una extrusora, la cual trabaja de una manera continua, o en un mezclador continuo para formar una masa. Se realiza un calentamiento de la composición obteniendo temperaturas de 130 °F a 260 °F, la extrusión de la composición se realiza bajo presión. La masa extrudada se lamina en caliente y se reduce su espesor y se forman las placas.

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deseadas las cuales son homeadas La maquinaria involucrada en los procesos de transformación y reducción de la masa involucran laminación, reducción por medio de rodillos y corte

De otra parte la anterioridad D3 presenta un procedimiento para obtener piezas de plátano en las cuales se ha removido el corazón Al ser obtenidas las piezas estas son sumergidas en una solución salina con jugo de limón por lo tanto el paso de hidratación del plátano que se presenta en el proceso para la elaboración de productos a base de una masa prefrita de plátano verde, es conocida en el arte previo

Como se puede observar en las anterioridades el freído del plátano es conocido así como la extrusión de materiales que contienen almidón para obtener una masa a la cual se le da una forma definida y a esas piezas formadas se les reduce el contenido de humedad Por lo tanto, es posible considerar que las operaciones que involucran el procedimiento descrito en la solicitud son operaciones básicas de transformación de la masa obtenida hasta la forma deseada, por lo que es posible derivarla del estado de la técnica

7 Conclusión

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así

Nº	Documento Nº	Reivindicaciones Afectadas	Requisito que Afecta
D1	US 4,242,365	1 y 3	NIVEL INVENTIVO
D2	US 4,834,996	1 a 5	NIVEL INVENTIVO
D3	US 4,740,381	3	NIVEL INVENTIVO

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de notificación de la presente comunicación En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente

Notifíquese el presente oficio conforme a lo dispuesto en el artículo 8 de la resolución reglamentaria No 00210 del 15 de enero de 2001, advirtiéndole que contra él no procede recurso alguno en la vía gubernativa


CLARA CASTELLANOS DE JAIMES
Jefe de División de Nuevas Creaciones (E)

El anterior requerimiento fue notificado por fijación en lista, de fecha 12 JUL 2001

CONCEPTO TECNICO No 0967	EXAMINADOR TECNICO Código No 202064
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[54] PROCESS FOR PRODUCING FRIED BANANA SLICES

[75] Inventors: Masayuki Numata, Fujisawa; Kenji Sugano, Tokyo, both of Japan

[73] Assignor: Meiji Seika Kaisha, Ltd., Tokyo, Japan

[21] Appl. No.: 74,622

[22] Filed: Sep. 12, 1979

Related U.S. Application Data

[63] Continuation of Ser. No. 924,812, Jul. 11, 1978, abandoned.

[30] Foreign Application Priority Data

Jul. 11 1977 [JP] Japan 51-89934

[51] Int. Cl.² A23L 1/212

[52] U.S. Cl. 426/438; 426/445; 426/615

[58] Field of Search 426/615, 438, 441, 445
426/466, 417 99/355, 403, 410, 472

[56] References Cited

U.S. PATENT DOCUMENTS

3,510,314	5/1970	Lima et al.	426/438 X
3,573,937	4/1971	Serna	426/441
3,718,483	2/1973	Lankford	426/438
3,821,419	6/1974	Swisher	426/438

Primary Examiner—Arthur L. Corbin
Attorney, Agent, or Firm—Sughrue, Rothwell, Miron,
Zinn and Macpeak

[57] ABSTRACT

A process for producing a dried banana product having a crisp texture and good storage stability comprising: frying slices of fully ripe raw banana flesh in an edible oil as rapidly as possible after slicing while substantially maintaining a pressure of about 30 to about 60 Torr and a frying temperature of about 75° to about 85° C., removing the banana flesh slices from the frying oil while still maintaining a pressure of about 30 to about 60 Torr; removing the excess frying oil adhering to the banana slices while still maintaining a pressure of about 30 to about 60 Torr; and thereafter restoring the pressure to atmospheric pressure. No anti-browning treatment is required.

2 Claims, No Drawings

4,242,365

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PROCESS FOR PRODUCING FRIED BANANA SLICES

This is a continuation of application Ser. No. 924,012, 5
filed July 11, 1978, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a process for producing a 10
dried banana product, and more specifically, to a process for producing a dried banana product having a crisp texture and good storage stability by frying slices of fully ripe raw banana flesh in an edible oil under reduced pressure thereby to dehydrate the banana flesh. 15

2. Description of the Prior Art

Fully ripe raw banana flesh generally comprises, by weight, 75.5% water, 1.3% protein, 0.4% lipid, and 21.4% carbohydrate. About 90% of the carbohydrate 20
comprises sucrose and reducing sugars, and starch accounts for about 2% of the entire banana. In addition to these components, ripe raw banana flesh contains some amount of crude fiber, ash and organic acids and small amounts of inorganic substances, vitamins, minerals, 25
tannins, and enzymes.

Drying of ripe raw banana flesh having such a composition is limited in many ways. For example, since the flesh contains a large amount of sucrose and reducing 30
sugars, the flesh has a low water activity. This makes dehydration of the flesh difficult, and long periods of time are required for drying the flesh. Consequently browning of the banana flesh occurs due to the presence of a group of enzymes such as polyphenoloxidase, and peroxidase, and the quality of the ripe raw banana is reduced.

In conventional methods for producing dried banana products, therefore, the usual practice is to inhibit the 35
activities of these enzymes by immersing the banana flesh in a solution of SO_2 or another sulfur dioxide generating agent or a solution of a browning inhibitor such as ascorbic acid. A blanching treatment with hot water or steam is another conventional means of inhibiting browning.

Ripe fruit inherently has a larger moisture content than unripe fruit, and contains less starch and crude 40
fiber and more sugars. Thus, the texture of ripe fruit is soft and weak. When the ripe banana flesh is subjected to a blanching treatment, the water content of the flesh is increased, and therefore, the texture of the ripe banana flesh is further softened. Hence, subsequent handling of the banana flesh in drying causes crumbling or 45
deformation of the ripe banana flesh to occur.

It is extremely difficult to dry slices of ripe raw banana flesh while retaining their shape. For this reason, according to conventional techniques, a dried banana 50
product generally called banana chips is produced by using flesh of unripe bananas having a solid texture and a total sugar content of as small as less than about 1% by weight as a starting material, and drying the flesh after 55
subjecting the flesh to a blanching treatment with hot water or steam, and/or after immersing the flesh in a solution of SO_2 or another sulfur dioxide generating agent or a solution of a browning inhibitor such as ascorbic acid, citric acid or ascorbic acid.

Naturally, the resulting dried banana products obtained lack the sweet taste, the unique flavor, the unique 60
color, etc. which are inherent to ripe raw bananas. The banana products are therefore processed further by, for

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example, treating the products with a solution of sugar and/or a gelatinous substance, or adding artificial flavor, dyes, etc. to enhance their flavor and color before they are marketed as final products.

On the other hand, products generally called banana powder or banana flakes are made from ripe bananas as a starting material. In order to facilitate drying, the bananas are mashed into a paste form, and then dried using a method such as foam mat drying, drum drying or low-temperature vacuum drying. These products do not have the original shape of a banana, and differ markedly from the dried banana products which are obtained by the process of the present invention.

SUMMARY OF THE INVENTION

An object of this invention is to provide a process for producing a dried banana product having a superior flavor, a crisp texture and good storage stability from 65
fully ripe banana flesh as a starting material.

The object of this invention is achieved by a process for producing a dried banana product, which comprises 70
frying slices of fully ripe raw banana flesh in an edible oil as rapidly as possible after slicing while substantially maintaining a pressure of about 30 to about 60 Torr and a frying temperature of about 75° to about 85° C. to dehydrate the slices;

removing the banana flesh slices from the frying oil while still maintaining a pressure of about 30 to about 60 Torr;

removing the excess frying oil adhering to the banana slices while still maintaining a pressure of about 30 to about 60 Torr and

thereafter allowing the reduced pressure to return to atmospheric pressure.

DETAILED DESCRIPTION OF THE INVENTION

The fully ripe raw banana flesh used as a starting material in this invention may be the flesh of any desired banana varieties, but generally, bananas of the Gros-Michel variety and the Cavendish variety are used. The 75
degree of ripening of the banana flesh is such that the surface banana skin is completely yellow or is yellow with some brown spots. Also the flesh of those bananas which are somewhat orange and taste harsh when eaten raw can be used in the present invention. Usually, however, such bananas are not desirable since the hardness of the taste remains even after the flesh is dried. Bananas which can be conveniently used as starting materials in the present invention have a total sugar content of at 80
least about 15% by weight, this sugar content being a measure of ripeness sufficient for use in this invention. Raw banana sugar content can be determined by total sugar in the banana as described in *The Chemistry and Technology of Food and Food Products*, Volume II, pages 1544 Table CXXVIII.

The starting bananas are first peeled, e.g. by hand. Then the banana pulp or flesh is cut into the desired shape to a thickness of about 1 to about 3 mm, preferably 2 to 3 mm, e.g., using a sharp knife or similar cutting means, preferably made of stainless steel. Conveniently and preferably the banana is cut crosswise into round 85
slices. The banana flesh can also be cut parallel to the longitudinal axis of the banana, and if required, the banana can be further sliced crosswise. When the thickness of the slices exceeds about 3 mm, the slices cannot be dried to a water content of about 1 to 3% without causing their surface and core to discolor, especially the

core in ducolor. When the thickness of the slices is less than about 1 mm, the slices tend to deform, and the final dried products may have an increased oil content or tend to break easily.

The banana flesh slices are as rapidly as possible after slicing placed in a frying vessel preferably a closure-equipped foraminous basket-like vessel e.g., made of wire mesh or punched-out metal, with care being taken not to deform the slices. When enzymes present in the banana cells which have been broken on the outer surfaces of the banana flesh slices come into contact with oxygen in the air, the texture of the banana is softened, and a browning reaction takes place. For this reason, the time between the cutting of the banana flesh and the contacting of the slices with a hot frying oil should preferably be as short as possible. Good results can generally be obtained when the banana flesh slices are contacted with the frying oil within about 20 minutes, preferably within 15 minutes, from the time the banana slices are cut.

When the banana flesh slices are placed in the frying vessel, the height of the banana flesh slices preferably is not more than about 30 mm. This is for the purpose of (1) preventing the slices having a soft texture from being deformed by their own weight, (2) preventing deformation and/or mutual adhesion of the banana flesh slices by leaving room for the slices to move in the frying oil upon rising to the surface of the oil, and (3) preventing the banana slices from deforming at the time the frying oil is removed after dehydration, at which time the banana slices still have a temperature near the temperature of the frying oil and are flexible.

The frying vessel containing the banana flesh slices is put into a tank for reduced-pressure frying. The tank is equipped with means for heating the frying oil, means for reducing pressure inside of the tank, and a means for removing the excess frying oil. One example of such a heating means is a jacketed heating device. Preferably the tank is equipped with a heat exchanger for supplying and recycling the heated frying oil. An example of an oil removing means is a centrifugal separator capable of rotating the frying vessel.

The frying vessel is placed in the frying tank, and the frying tank is closed. Then, the pressure of the inside of the tank is reduced and maintained at about 30 to about 60 Torr. An edible oil e.g., rice oil, hardened palm oil, hardened coconut oil, as the frying oil may be put into the tank beforehand, or supplied to the tank during the pressure reducing step. Or the oil can be supplied to the tank after the inside of the tank has attained the reduced pressure desired. In this way, the banana flesh slices are contacted with the frying oil.

Reduced pressures of less than about 50 Torr are not easily obtained when a conventional cooling water condenser is used, and such a degree of pressure reduction is not required to achieve the object of this invention. On the other hand, at a pressure in excess of about 60 Torr the banana flesh slices cannot be dried to a water content of about 1 to 3% without browning occurring in the absence of a browning inhibitor or an antioxidant.

Frying of the banana flesh slices is performed under the reduced pressure conditions described above while maintaining the frying oil at a temperature of about 75 to about 85° C. Temperatures outside this range are not desirable. If the oil temperature is lower than about 75° C., the viscosity of the frying oil increases and long periods of time are required for dehydration, thus caus-

ing the oil content of the dried product to increase. If the oil is maintained at a temperature higher than about 85° C., a Maillard reaction takes place between the sugars and amino acids contained in the banana, and a browning of the product occurs. Browning becomes pronounced particularly at the core area of the banana flesh slices. If the oil temperature exceeds about 110° C., excessive foaming of the soft banana flesh slices causes deformation or rupture of the product.

Even when the oil temperature is below about 75° C., if the pressure is maintained at below about 30 Torr, dried banana products having a water content of about 1.5 to 3.0% can be obtained. However, since enzymes in the product still remain active, enzymatic browning of the product during storage tends to occur.

When frying is begun, the temperature of the frying oil tends to decrease due to the evaporation of water from the banana flesh slices and due to the heat absorption by the banana flesh slices. It is therefore, necessary, to heat the frying oil suitably so as to maintain the temperature of the frying oil within the above-specified range. The level of the oil surface should be such that when the water in the banana flesh slices boils and foaming occurs, the slices do not reach the closure of the frying vessel.

The frying time should be determined on consideration of various factors such as the thickness and diameter of the banana flesh slices, the temperature of the frying oil, and the pressure within the frying tank. Usually the frying time is about 15 to about 40 minutes.

During the frying, the banana flesh slices rise to the oil surface and move about while foaming occurs. During the frying, when the frying vessel is completely submerged in the oil or the banana flesh slices are submerged in the oil by using a wire net lid, the level of which is adjustable in the frying vessel, the banana flesh slices which tend to rise to the surface of the oil will be compressed by the wire net lid or by the closure or inner wall of the vessel. This results in a deformation of the banana slices or in a non-uniformly dehydrated condition. In addition, the steam which comes from the banana flesh slices urges the banana slices against opening portions such as the wire net or the closure or inner wall of the vessel to clog these portions. Consequently the inside pressure of the frying vessel is increased, as a result, to drastically reduce the effect of frying under reduced pressure, and the product is markedly discolored.

When foaming of the banana flesh slices has almost subsided, and the frying comes to an end the banana slices are separated from the frying oil, e.g., picking up the frying vessel from the frying oil or discharging the frying oil from the tank by a pump or the like, while the reduced pressure condition described above is still maintained. Then, the excess of the frying oil adhering to the banana slices is removed. Removal of the excess oil can be achieved, for example, by using a centrifugal separator which rotates the frying vessel, or a vibrator device which vibrates or taps the frying vessel.

During removal of the excess of the frying oil, the banana slices still have some flexibility because they still have a temperature near the temperature of the frying oil. Accordingly the removal of the excess oil should be performed under conditions such that deformation or damage to the banana flesh slices will not occur. For example, when the oil removal is performed by centrifugal separation, the peripheral linear speed of the frying vessel is preferably about 200 to about 300 m/min.

Thus, when the excess of the frying oil has not been removed sufficiently, the dried banana product has an oil content of more than about 25%. Thus, the product is greasy and not tasty. On the other hand, when an oil content of less than about 18% is desired, an efficient operation for removal of the frying oil is needed and consequently the product tends to be deformed or damaged.

After removing the excess of the frying oil, the reduced pressure is released, and returned to atmospheric pressure. Then, the fried dry banana product is taken out of the frying vessel. The dried banana product thus obtained has a water content of about 1 to about 3% and an oil content of about 18 to about 25%.

To achieve the objects of this invention, the steps set forth above should be performed in the sequence described. If the reduced pressure is released before the fried banana slices have been separated from the frying oil, the frying oil will be forced into voids within the tissues of the banana slices, and it will be impossible to remove the excess of the frying oil with good efficiency. Also, if an attempt is made to remove the excess oil from the banana slices after separating the banana slices from the frying oil, releasing the reduced pressure and then taking the banana slices out of the frying tank, it is impossible to achieve sufficient oil removal because the frying oil penetrates into the tissues of the banana flesh and the efficiency of removal is reduced.

The process of this invention makes it possible to produce a dried banana product having a good color and good storage stability from slices of fully ripe raw banana flesh as a starting material which are susceptible to crumbling or deformation because of their soft and weak texture. What is noteworthy is that this can be achieved without using browning inhibitors, antioxidants, etc., some of which are toxic or hazardous to humans or are likely to impair the flavor and taste of the banana. The final dried banana product substantially retains the shape and size attained at the time of slicing the starting material into the desired shape. The product has a crisp texture and a superior flavor and taste.

The following Examples are given to illustrate the present invention in more detail.

EXAMPLE 1

Bananas of the Cavendish variety which were fully ripe, whose skins were yellow with no hint of green, were peeled, and cut crosswise into round slices each having a thickness of 2 mm using a stainless steel knife to obtain 200 g of banana flesh slices. With care taken not to deform the banana slices, they were rapidly placed and stacked in a closure-free frying basket made of wire mesh to a layered thickness of about 30 mm.

Purified rice oil (4 kg) was put into a reduced-pressure frying tank equipped with a steam jacket, a cooling water condenser and a vacuum pump, and the oil was heated to 80° C. by the steam jacket. The frying basket containing the banana flesh slices was then placed in the tank and the banana flesh slices were contacted with the frying oil. The time between the peeling of the bananas and the contact of the slices thereof with the frying oil was about 4 minutes.

The frying tank was sealed, and the pressure was reduced. The frying oil was heated so as to maintain its temperature at 80° C. The banana slices immediately began to foam, and rose to the frying oil surface. In about 3 minutes, the pressure was reduced to about 60 Torr. Heating was continued to maintain the oil temper-

ature at 80° C. The banana slices moved about on the foaming oil surface. The pressure inside the tank gradually decreased, and reached 30 Torr in about 10 minutes. After the frying had been performed for about 23 minutes, the foaming almost subsided. While maintaining the reduced pressure level, the basket was pulled up from the frying oil, and the frying oil was allowed to drip from the banana slices for 2 minutes. Then, the basket was vibrated electrically to remove the excess of the frying oil adhering to the banana slices. Then, the pressure was returned to atmospheric pressure, and 38 g of a dried banana product was obtained.

Analysis of the dried banana product showed that the product had a water content of 1.8% and an oil content of 24%. The dried banana product was a tasty product with a crisp texture, and the shape, size, color, flavor and taste which the banana slices had just after slicing were substantially maintained.

EXAMPLE 2

Bananas of the Gros-Michel variety, whose surface skin was completely yellow with some brown spots, were peeled, and cut crosswise into round slices with a thickness of 2 mm using a slicer having a stainless steel blade to obtain 10 kg of banana flesh slices.

With care taken not to deform the banana flesh slices, they were rapidly placed and stacked to a layered thickness of about 42 mm in a closure-equipped frying basket made of punched out metal, and the basket was closed.

The frying basket was placed in a reduced-pressure frying tank equipped with a steam jacket, a cooling water condenser, a vacuum pump, a pump for supplying and discharging the frying oil, and a rotating shaft for rotating the frying basket. The frying tank was sealed, and the pressure inside the tank was reduced to about 60 Torr.

Then, about 50 kg of purified hardened palm oil heated to 80° C. was fed into the frying tank to contact the oil with the banana flesh slices. The time between the peeling of the bananas and contact of the banana flesh slices with the frying oil was about 10 minutes.

Immediately, heating with the steam jacket was started. The temperature of the oil was maintained, and the pressure was maintained at about 60 Torr. The banana slices rose to the oil surface and moved about with foaming. The pressure inside the tank gradually decreased, and reached 30 Torr in about 7 minutes. After frying for about 23 minutes, the foaming had almost subsided.

While maintaining the reduced pressure level, the frying oil was withdrawn by the pump. Then, the frying basket was rotated, and the excess frying oil was centrifugally removed from the banana slices at about 120 rpm for about 2 minutes. The pressure was then returned to atmospheric pressure, and 2.6 kg of a dried banana product was obtained.

Analysis of the resulting dried banana product showed that the product had a water content of 2.0% and an oil content of 26%. The dried banana product had a crisp texture, and the shape, size, color, flavor and taste which the banana flesh slices had just after slicing were substantially maintained.

EXAMPLE 3

The dried banana product obtained in Example 1 was tested periodically for a variation in color by accelerated moisture absorption.

United States Patent (19)

Fazzolare et al.

(11) Patent Number 4,834,996

(45) Date of Patent: May 30, 1989

(54) EXTRUDED STARCH SNACK FOODS AND PROCESSES

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(21) Appl. No.: 62,673

(22) Filed: Jan. 16, 1987

Related U.S. Application Data

(63) Continuation-in-part of Ser. No. 772,918, Sep. 2, 1983,
which is a continuation-in-part of Ser. No. 681,647
Dec. 14, 1984, abandoned.

(51) Int. Cl.² A21D 6/00; A23P 1/00

(52) U.S. Cl. 426/303; 426/436;
426/438; 426/302; 426/330; 426/360

(58) Field of Search 426/349, 350, 458, 456,
426/637, 302, 808, 302, 360

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(57) ABSTRACT

The invention is a continuous process and a product of
the process for preparing a low fat content chip-like
baked snack food from a composition containing at least
one ingredient having starch. Water and the ingredient
having starch comprise substantially all of the ingredi-
ents of the composition. The method involves mixing
and heating the composition in a cooker extruder or
continuous mixer to form a dough-like consistency. In
the most preferred embodiment of the invention the
ingredient including starch is either a corn or a potato
ingredient. The heating is conducted until the composi-
tion obtains a temperature of from about 130° F. to
about 260° F. The composition is extruded under a
pressure drop which substantially avoids expansion of
the extrudate to obtain an extrudate having a water
content of from about 25% by weight to about 60% by
weight. The extrudate is sheeted, while hot. The
sheeted composition is then laminated, reduced in thick-
ness, formed into pieces, and baked in a conventional
oven. During baking the exterior layer of the dough
cooks rapidly and traps steam in the interior portion of
the dough. Blisters and curls result in the final product
that impart a chip-like appearance to the final product.
An alternative embodiment includes applying a spray
oil to the pieces before baking to obtain a final product
having a flat cracker-like appearance.

13 Claims, No Drawings

4,834,996

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may does not apply steam directly to the dough and requires specific abrasion characteristics for the starch material to form the dough. This process does not produce a baked chip-like snack food.

U.S. Pat. No. 4,413,882 to Chittenden discloses a process wherein roasted corn flour, wheat flour, sugar and salt are mixed together. The mixture is shaped or extruded, and baked between 140° C and 155° C. It is then cooled immediately and toasted. This process does not produce a baked snack food having a chip-like texture.

The present invention provides a process for the continuous production of a low fat content, baked chip like snack food from a sheeted dough. Starchy ingredients are processed in a cooker extruder to obtain a workable or machinable dough-like composition that can be machined or shaped and processed according to cracker technology to produce the baked, chip-like snack food.

SUMMARY OF THE INVENTION

The process of this invention comprises the steps of mixing at least one leguminous having starch with water to form a composition. The water may be added in the form of tap water, or heated water, either alone or in combination with steam to provide hydration of the starch-containing ingredient. Heating of the composition then is performed with continued mixing for a sufficient amount of time to form a machinable dough-like consistency. The mixing and heating are performed continuously in a cooker extruder.

The heating may be accomplished by direct steam injection, by indirect heating or heating jackets, or a combination of direct steam injection and indirect heating. The wetted dry ingredient composition is heated to a temperature of from about 130° F to about 260° F and at a pressure of less than about 250 psia, typically from about 25 psia to about 125 psia. The heated composition is extruded to avoid substantial separation and to obtain an extrudate having a moisture content of from about 25% by weight to about 60% by weight, typically less than or equal to 50% by weight, preferably from about 25% to about 45% by weight based upon the weight of the extrudate.

The dough like composition is machined by any of a number of conventional means including those means used in cracker technology. The dough may be sheeted while hot typically at a temperature of at least about 110° F. The sheeted dough is laminated, the laminate is reduced in thickness, cut into pieces, and the pieces are then baked to obtain a chip-like texture.

The starch component of this invention can include any ingredient having starch such as any commercially available native or modified cereal, root, or leguminous starch, partially or completely gelatinized starch, dried or dehydrated potato product including potato flour, potato granules, and potato flakes, corn flour, corn meal, buckwheat flour, rice flour, barley flour, lupine, and mixtures of these. Typically the at least one ingredient comprising starch is at least about 35% by weight of the extrudate. Alternative embodiments of the starch component can include a gluten-containing starch ingredient such as wheat flour, rye flour, sorghum flour, graham flour, and mixtures of these.

The machining processes used in this invention can include cracker machining which involves laminating, reduction rolling, and cutting, and extruder machining. The baking used in this invention is usually performed with convection heating, however dielectric energy

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applications can be used as a post-baking process to further the drying of the product.

An embodiment of the method of this invention uses starch ingredients that are mixtures of a non-gluten containing ingredient and a wheat or other gluten-containing flour.

A post bake spray oil application is optional and included in the preferred embodiment. The preferred embodiment of the invention produces a dry crisp snack food in which the dough laminae are partially separated during baking and form "blister like" formations. An alternative embodiment produces a flat double ended snack food product. This product is a baked snack food product that can have the appearance of a "chip" product such as a potato chip.

DETAILED DESCRIPTION OF THE INVENTION

The gelatinized starch snack foods of this invention are prepared from conventional starchy materials or ingredients having starch. Commercially available native or modified cereal, root, or leguminous starches, and partially or completely gelatinized starches and ingredients comprising them may be used. Preferred embodiments are made from dried or dehydrated potato products such as a mixture of potato flour and potato flakes or a mixture of potato flour and potato granules. Desirable alternative embodiments can be made from potato flour, potato flakes, potato granules, corn flour, and corn meal and other ingredients either used separately or in various combinations. Each of these ingredients has a high starch content, but is absent of gluten. When mixed with water these ingredients have no elasticity because of their lack of gluten. The inability to stretch makes the wet compositions prepared from these ingredients unsuitable for conventional handling and machining as used in cracker technology.

Other starch-containing ingredients can be used as alternative embodiments of this invention. Examples of other non-gluten, starch-containing ingredients include buckwheat flour, rice flour, barley flour, lupine, and mixtures of them. Non-gluten, starch-containing ingredients can also be blended with gluten-containing ingredients to vary the flavor and/or texture of the final product. Gluten-containing ingredients which can be used include wheat flour, rye flour, sorghum flour, and graham flour.

Corn germ can be added to the dough composition in small quantities to modify the flavor and texture of the final product. Corn germ is a by product of milling corn and gives a starchy snack food product a sweet flavor and crunchy texture. Corn germ added in an amount up to 20 percent by weight of the total ingredients having starch can be used to enhance the flavor of the final product.

Vegetable shortening or oil, or fat can also be present preferably in an amount less than 20 percent by weight of the finished product. The amount may suitably be less than 10% of the finished product, however higher amounts tend to avoid a dry mouthfeel. Usually less than 2 percent of the oil used in this process is mixed into the snack food ingredients. The remainder of the oil is applied topically to the machined and cut pieces before baking or to the final product after baking. Vegetable shortening and oil are used to modify flavor and texture of the final product. The vegetable shortening or oil mixed into the composition is preferably added to

United States Patent (19)
Bermajo

(11) **Patent Number:** 4,740,381
(45) **Date of Patent:** Apr 26, 1988

[54] **PROCESS FOR PREPARING PLANTAIN AND PRODUCT THEREOF**

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[21] **Appl. No.** 93,246

[22] **Filed:** Sep. 4, 1987

[51] **Int. Cl.** A23L 1/212

[52] **U.S. Cl.** 426/615; 426/438; 426/404

[38] **Field of Search** 426/438 481, 482, 484, 426/615

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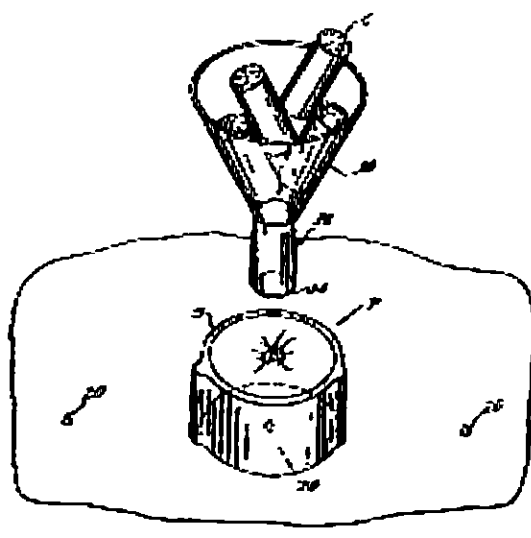
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(57) **ABSTRACT**

A process for preparing green plantains and the product derived therefrom wherein the green plantain is radially sliced and the core removed. Next, the plantain is immersed in a salted solution with lemon juice after the skin has been removed from the slices. Then, the slices are fried briefly and then flattened out. The resulting product is then frozen and packed for shipment.

6 Claims, 2 Drawing Sheets



PROCESS FOR PREPARING PLANTAIN AND PRODUCT THEREOF

BACKGROUND OF THE INVENTION

1 Field of the Invention

The present invention relates to the processing of plantains.

2 Description of the Related Art

Traditionally bananas and plantains have been a staple food item in most South American families. This fruit has been cooked in numerous ways. One of them involves frying slices of green plantains. Usually, the green plantains are peeled, cut in slices, the slices are smashed against a flat surface and then fried. Depending on how thick the slice is, how well it was smashed and the amount of time it was fried will determine how crispy the final product is. It is a common source of complaints from those who consume these food items that the internal parts are soggy and not well cooked.

At the same time all of the plantains consumed in the United States comes from other countries mostly Latin American countries and it is quite desirable to minimize the transportation cost by eliminating the non-edible parts of the plantain. Also, the storage space required will be reduced facilitating the logistics involved.

There have been a number of banana peeling machines designed such as U.S. Pat. No. 4,446,782 issued to Black in 1984 and U.S. Pat. No. 3,627,011 issued to Pound. However none of these disclosures describe the process disclosed herein or the article produced by this process.

Other patents describing the chosen subject matter provide for a number of more or less complicated features that fail to solve the problem in an efficient and economical way. None of these patents suggest the novel features of the present invention.

SUMMARY OF THE INVENTION

It is one of the main objects of the present invention to provide a process for preparing sliced green plantains and including the removal of the core from the slices in order to facilitate the eventual prime operation by the consumer.

It is another object of this present invention to provide a process for preparing sliced green plantains that facilitates its transportation by reducing the weight of the product being transported.

It is yet another object of the present invention to provide such a device that is inexpensive to manufacture and maintain while retaining its effectiveness.

Further objects of the invention will be brought out in the following part of the specification, wherein detailed description is for the purpose of fully disclosing the invention without placing limitations thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

With the above and other related objects in view, the invention comes in the details of construction and combination of parts as will be more fully understood from the following description, when read in conjunction with the accompanying drawings in which:

FIG. 1 represents a green plantain after being sliced.

FIG. 2 shows a slice of the green plantain shown in FIG. 1 positioned on a guiding pin protruding from a flat surface and a core remover above the slice ready to operate.

FIG. 3 illustrates a cross-sectional view of the core remover cutting through the middle of the slice.

FIG. 4 is a representation of the slice with the skin and core removed.

FIG. 5 is a cross-sectional view of the slice after being placed on a tubular guide that protrudes through a flat surface and a flattening or smashing member above it.

FIG. 6 shows the operation of the flattening member as it is guided through the tubular member pushing any plantain excesses extending towards the middle of the slice.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present process invention has been sequentially represented in FIGS. 1 through 6. Basically the first step of the process is to slice a green plantain radially as illustrated in FIG. 1. Then, the slice is positioned on a flat surface as shown in FIG. 2. Preferably guiding pins 20 will be used to position plantain slice P in a predetermined space. This is particularly useful when this process is automated since it provides a predetermined location for this slice to be positioned. Next, the core C is removed by using a suitable device such as core removing member 30 shown in FIG. 3. Core remover member 30 has substantially a conical shape that terminates with a cylindrical portion 32. Cylindrical portion 32 has cutting edges 34 sufficiently sharp to easily cut through plantain slice P. Skin S provides some degree of structural stability to slice P while at the same time it provides protection from human contact with the plantain itself. The person preparing the plantain may handle the plantain by holding it from the area where the skin is still attached to the slice. After that, slice P is peeled off and immersed in a water solution of salt and lemon juice intended to bleach the plantain and provide protection against oxidation. Preferably, one ounce of lemon juice for each gallon of water is used and two ounces of salt. As an alternative, slice P may be peeled off prior to removing core C. It is well known that fruits, including plantains and bananas, become dark in areas where they are touched and exposed to oxidation.

The next step involves precooking the plantain slice which is accomplished by a brief immersion in hot vegetable oil preferably at 275° F. In FIG. 5, the next step of the process is illustrated where a smashing or flattening member 40 is used to flatten out slice P. The opening formed by removing core C is positioned over guiding tubular member 50. Flattening device 40 includes cylindrical rod 60 that is rotatable within guiding tubular member 50 so that when plantain slice is flattened any portions thereof that move inwardly are punched through tubular member 50 and discarded. A stop member 55 is used to prevent flattening member 40 from smashing slice P excessively. The resulting product is then frozen.

After this process the resulting product is a smashed plantain slice with the middle core C removed. Core C includes the seeds of the plantain. The seeds in the center of a slice of fried green banana or plantain is undesirable, especially after being smashed and the seeds compressed because it produces an area that is relatively hard. This process allows for minimal handling of the plantain and by removing the core it makes it easier to cook when it is eventually fried by the consumer. Also, by eliminating the extra weight the cost of transportation is greatly reduced.

It is believed the foregoing description conveys the best understanding of the objects and advantages of the