

LLOREDA & CIA. S. A.
ABOGADOS

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 05-042911-00003-0000

Fecha: 07-06-27 15:52:43 Dep: 2020 NUECREACION
Tra: 11 PATENTEY: Eve: 379 FASENACIONALII
Act: 538 PETICION Folios: 2

Señor

SUPERINTENDENTE DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES

E. _____ S. _____ D. _____

BOGOTA - COLOMBIA
OFICINA FUNDADA EN 1941
APARTADO AEREO 12304
TEL: 57-1-3264270 57-1-6069700
FAX: 57-1-3264271 57-1-6069701
CABLES: LLOREDA
CALLE 72 No. 5-83 5º. PISO
www.lloredacamacho.com
jlcco@lloredacamacho.com

Re: P1.-NESTEC S.A.-Solicitud de Patente de Invención en Fase
Nacional PCT para "CEREALES PARA DESAYUNO".-Clase A23L
1/18.-Expediente número 05-042.911.-

1. Me refiero a mi memorial de 11 de Julio de 2005.
2. De conformidad con lo dispuesto en el Artículo 5.2.12 de la Circular Externa No. 03 de 28 de Abril de 2003, y estando dentro del plazo de seis meses contados desde la fecha de la publicación de la solicitud en la Gaceta de la Propiedad Industrial número 573 de 28 de Febrero de 2007, solicito a ese Despacho proceder a realizar el examen de patentabilidad de la presente invención.
3. Me permito recordar a usted, que tal como se informó en el Petitorio de la invención, la presente solicitud corresponde a Capítulo II.
4. Anexo me permito acompañar recibo número 07-50.073, expedido por la Superintendencia de Industria y Comercio, que acredita el pago de la tasa que dicho examen causa.

Señor Superintendente,

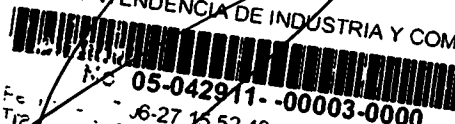
ALICIA LLOREDA RICAURTE
T.P. 53.215

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 990176089-2

RECIBO OFICIAL DE CAJA : 07 - 50,073
FECHA : JUNIO 22 DE 2007

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



Fe 06-27-06 15:52:43 Dep 2020 NUECREACIONI
Tr 1 ENTREYII Eve 379 FASENACIONALII
Ac 538 PETICION Folios. 2

***** CONSIGNACION *****

DEPOSITANTE	TIPO PASO	BANCO	CUENTA	Nº. PASO	FECHA PASO	Vr. PASO
LLORERA Y CIA S. A	CONSIGNACION	BANCO POPULAR	050-00110-6	55092636	22/06/2007	7,792,000.00

***** CONCEPTO *****

CANT. RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1 50005-01-01 SOLICITUDES	114 PTC CAP-II EXAMEN DE PATENTIBILID	202,000.00
	TOTAL :	\$ 202,000.00

SON: DOSCIENTOS DOS MIL PESOS

RESPONSABLE : _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE N°. _____

61

DIVISIÓN DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 05 042911

EL EXTRACTO DE LA PRESENTE SOLICITUD DE **PATENTE DE INVENCION**

FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No **573** DE

FECHA **28 DE FEBRERO DE 2007** EL TÉRMINO HÁBIL SEÑALADO POR LA

LEY EXPIRA EL **30 DE MAYO DE 2007**

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 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI _____

NO X

62
62

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES

2020
Bogotá, D. C., 18 de febrero de 2009

Doctor
Alicia Lloreda Ricaurte
Representante **Nestec S. A.**

ASUNTO Radicación **05-42911**
 Trámite 002
 Evento 001
 Actuación 430
 Oficio 3196
 Folios 033

Patente de Invención ☒ Patente de Modelo de Utilidad ☐

Vía Nacional ☐

Vía PCT (fase nacional) ☒ Cap. I ☐ Cap. II ☒

No. Sol. Internacional **PCT/EP2003/012307**
Fecha de Presentación Internal. **5 de noviembre de 2003**

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:

1. Documentos estudiados

- 1.1. Descripción: Folios: 28 a 46 tal como se radicó inicialmente
- 1.2. Reivindicaciones: Folios 47 a 48 tal como se radicó inicialmente
- 1.3. Prioridad:
- | | |
|--------|------------------------|
| Fecha | 6 de noviembre de 2002 |
| País | EP |
| Número | 02024760.7 |

2. Objeto de la invención

- Título de la solicitud (folio 1) **Cereales Para Desayuno**
- Las reivindicaciones 1 a 13 de la solicitud en estudio se refieren a *un producto basado en cereal, caracterizado en que cambia o pierde el color cuando se le adiciona un líquido acuoso*
- El anterior producto busca *proporcionar un cereal atractivo para los niños.*
- La Clasificación Internacional de Patentes (IPC) para esta solicitud es A23L 1/28.

3. De la solicitud de Patente

3.1. Descripción (Artículo 28 D. 486)

La descripción de la solicitud en estudio presenta los siguientes defectos:

- *Algunos traductores emplean la palabra "sucrosa" como la traducción de la palabra inglesa "sucrose"; esta traducción es equivocada e inaceptable. El término correcto en español es "sacarosa". Deberá reemplazarse en todo el documento sucrose por sacarosa.*

Por lo anterior, la descripción no cumple con el requisito de claridad y/o divulgación completa que permita su comprensión y ejecución de acuerdo al art. 28 de la Decisión 486 y/o art. 22 del Tratado PCT

3.2. Reivindicaciones (Artículo 30 D. 486)

El capítulo reivindicatorio de la solicitud en estudio presenta los siguientes defectos:

- *Las reivindicaciones 6 y 7 relacionan el recubrimiento exterior e interior de la reivindicación 1, cuando en dicha reivindicación 1 no se mencionan dichos recubrimientos, causando que las reivindicaciones 6 y 7 sean inconsistentes en su dependencia.*
- *La reivindicación 7 relaciona un "azúcar de colócate", frase incongruente que debe tratarse de un error tipográfico que hay que corregir.*
- *La reivindicación 8 es incoherente, toda vez que relaciona que el cereal de la reivindicación 1 es café / chocolate. Entonces no es posible identificar si el solicitante habla de un cereal o de café o de chocolate pues todos son productos diferentes que no pueden ser considerados específicos los unos de los otros.*
- *La reivindicación 11 no está definiendo materia alguna para protección. Afirma que está basada en "el cereal de la presente invención" pero no concreta como se configura el producto para cereal; el que esté basado en lo relacionado en reivindicaciones previas no implica que se enseñe el producto objeto de protección.*
- *Las reivindicaciones 12 y 13 relacionan explícitamente el uso de un producto, algo que la legislación no permite proteger. Deberán eliminarse dichas reivindicaciones.*

Por lo anterior, el capítulo reivindicatorio no cumple con el requisito de definición, claridad, concisión o sustento por la descripción de acuerdo al art. 30 de la Decisión 486 y/o art. 22 Tratado PCT.

4. Determinación del Estado de la Técnica

- *La fecha que se ha tenido en cuenta para determinar el estado de la técnica es 6 de noviembre de 2002*
- *Teniendo en cuenta la fecha indicada se realizó la búsqueda en el estado de la técnica de documentos relacionados con la solicitud encontrándose los siguientes documentos más relevantes:*

64
64

Nº	Documento	Título	Fecha de publicación*
D1	US 5894027	Milk and protein powder coated cereal product	13.04.1999
D2	US 2001/0008646	Modified oat and corn grit products and method	19.07.2001
D3	WO 00/64271	Appearance modified aerated confection and method of preparation	02.11.2000
D4	US 4755390	Process for the production of a flavored cereal product	05.07.1988

5. Análisis de patentabilidad (Artículo 14 D. 486)

El solicitante propone como nuevo a un producto basado en cereal, caracterizado en que cambia o pierde el color cuando se le adiciona un líquido acuoso. En el mercado es bastante común encontrar cereales que cambien de color al adicionar un líquido acuoso, especialmente leche. Para un técnico medio lo pretendido proteger resulta demasiado conocido y evidente.

Prueba de lo anterior son los documentos relacionados en la tabla anterior, donde es posible que el cereal cambie de color de muchas formas al agregarle un líquido acuoso. Una de ellas (US 5894027) es recubrir el cereal con una capa soluble en agua fría, donde dicha capa está hecha de sólidos de leche o similares, y vitaminas y minerales en polvo; podría también contener azúcares, grasas, carbohidratos, etc. Otra posibilidad (US 2001/0008646) es tomar avena (u otro cereal, lo cual resulta obvio para un técnico medio) y recubrirla con un aglomerado (que puede ser colorantes, saborizantes, nutrientes y/o endulzantes) por atomización, donde el producto de avena al entrar en contacto con un medio acuoso, como leche o agua, los colorantes del recubrimiento se disuelven o dispersan en el medio acuoso tomando un nuevo color el cereal (ver párrafos [0025], [0029] y [0030] como ejemplo); WO 0064271 relaciona otro tipo de alimentos, los cuales pueden ser cereales, donde una composición basada en sacarosa y colorante(s) cubre la superficie del alimento y al adicionar leche existe un cambio de color (ver página 10).

El documento US 4755390 enseña como un cereal puede contener capas de ciertos sabores los cuales al agregar un fluido acuoso, transfiere su contenido al fluido y cambia sus propiedades. El mismo principio aplicado en el presente documento.

Por todo lo anterior, la presente solicitud carecería de los requisitos necesarios para que se le conceda el privilegio solicitado.

6. Conclusión:

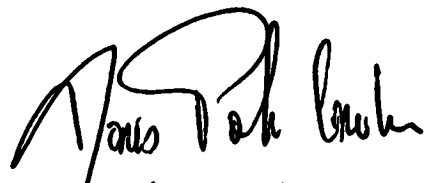
Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

Nº	Documento Nº	Reivindicaciones afectadas	Requisito que afecta
D1	US 5894027	1 - 13	Novedad
			Nivel inventivo
D2	US 2001/0008646	1 - 13	Novedad
			Nivel inventivo
D3	WO 00/64271	1 - 13	Novedad
			Nivel inventivo
D4	US 4755390	1 - 13	Nivel inventivo

65

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 numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.


Doris E. Polo
Jefe de División (E)
Nuevas Creaciones

Concepto Técnico No. 529
Examinador Técnico 202003

13 MAR. 2009

El anterior requerimiento fue notificado por fijación en lista, de fecha _____

United States Patent (19)
Kazemzadeh

(11) Patent Number: **5,894,027**
(45) Date of Patent: **Apr. 13, 1999**

(54) **MILK AND PROTEIN POWDER-COATED CEREAL PRODUCTS**

(75) Inventor: **Masoud Kazemzadeh, Bloomington, Minn.**

(73) Assignee: **MJM Technologies, L.L.P. Stacy, Minn.**

(21) Appl. No.: **08/946,318**

(22) Filed: **Oct. 7, 1997**

Related U.S. Application Data

(60) Provisional application No. 60/028,020 Oct. 9, 1996

(51) Int. Cl. 6: **A21D 13/00; A21L 1/216; A23L 1/164**

(52) U.S. Cl.: **426/94, 426/289, 426/290, 426/291; 426/303, 426/620, 426/621**

(58) Field of Search: **426/289, 290, 293, 302, 303, 620, 621**

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,557,718 1/1971 Chivers
3,615,647 10/1971 Kazemzadeh
3,615,655 10/1971 Freeman et al.
3,615,676 10/1971 McKown et al.
3,723,131 3/1973 Busby et al.
3,764,715 10/1973 Henderson et al.
3,814,822 6/1974 Henderson et al.
3,873,748 3/1975 Schwab et al.
3,955,000 5/1976 Baggett
3,959,498 5/1976 Lyall et al.
3,976,793 8/1976 Olson et al.
4,038,427 7/1977 Marus
4,061,790 12/1977 Cole, Jr.
4,079,151 3/1978 Schulte et al.
4,089,984 5/1978 Galbertson
4,097,613 6/1978 DeLaender et al.
4,101,680 7/1978 Edwards
4,140,803 2/1979 Paschuk et al.
4,180,594 12/1979 Graf
4,336,339 7/1982 Edwards

4,379,171 4/1983 Furda et al.
4,409,250 10/1983 Van Hulle et al.
4,501,759 2/1985 Gayewski
4,702,925 10/1987 Veneco
4,751,740 7/1988 Calandro et al.
4,756,920 7/1988 Willard
4,822,626 4/1989 Spenser et al.
4,853,235 8/1989 Tomonatsu
4,876,101 10/1989 Willard
4,880,645 11/1989 Carpenter et al.
4,961,943 10/1990 Blashore et al.
5,019,403 5/1991 Krochta
5,188,860 2/1993 Hermann et al.
5,196,219 3/1993 Hsu
5,372,826 12/1994 Holtz et al.
5,413,805 5/1995 Delprere
5,532,010 7/1996 Spenser et al.

FOREIGN PATENT DOCUMENTS

217409 A2 10/1985 European Pat. Off.

Primary Examiner—Nina Bhat
Attorney, Agent, or Firm—Merchant, Gould, Smith, Edell, Welter & Schmidt, P.A.

(57) **ABSTRACT**

Breakfast cereal products coated with a cold-water-soluble coating made from milk solids or high protein vitamins, and mineral supplement powders adhering to the surface of the cereal via an adhesive or conditions making the surface of the cereal adherent are described. The cereal itself may contain in its basic recipe milk solids, fibers, sugars, fats and carbohydrates, various proteins and minerals, thus classifying the basic cereal formula as a high energy and/or high protein and/or high fiber cereal product, which may be fortified with other essential minerals and vitamins used commonly as dietary supplements. This product is processed in a manner so that a coating is applied composed of such products which remain soluble in cold water at the time of consumption, even after drying and eliminates the need for liquid milk requiring only tap water to generate a similar taste, color, and texture, as well as mouth sensation, at the time of consumption of the cereal.

12 Claims, No Drawings

MILK AND PROTEIN POWDER-COATED CEREAL PRODUCTS

This application claims benefit under 35 U.S.C. 119 (e) of Provisional Application 60/028,020 filed Oct. 9, 1996.

BACKGROUND OF THE INVENTION

Breakfast cereals are a major component of the western daily diet. It is a \$13 billion per year market in the U.S. (projected for 1996) and has been one of the fastest growing segments of the food industry in Europe and some developing countries. Most cultures appreciate the taste and the texture, as well as the nutritional value, which is imparted by such foods. However, in many cases of developing countries, as well as in some of the specialty markets such as the Armed Forces, there is no easy access to liquid milk. Due to this lack of availability of milk as well as other considerations, such as some groups' intolerance to lactose coupled with the impossibility in some developing countries of obtaining and storing liquid milk at all times within the household, or at the place of consumption, the consumption of the cereal is avoided and sometimes diminished to non-existence.

SUMMARY OF THE INVENTION

This invention provides for milk solids with appropriate whitening ingredients either soya-based or from milk or other high protein sources, which are prepared and affixed to the surface of the cereal such that the particulate does not release moisture to the starch-based cereal grain, nor does it cause migration of moisture or fats from its surface to the adjacent starch or sugar-based cereal pieces. This coating may contain other sources of nutrients, such as sugars and fibers and carbohydrates, as well as modified and hydrolyzed proteins, hydrolyzed carbohydrates, fibers, and the like to provide a stable coating yielding the required texture, color, taste and mouthfeel to mimic the appearance and taste of having milk with cereal when cold water is added to the coated cereal. The purpose of the invention is to make eating of cereals more frequent, as well as more efficient for the consumer, so that its consumption is not dependent on any other ingredients outside of the package except tap water. This will make the consumption and marketing of such cereals in developing countries, as well as the Armed Forces, more realistic and in line with the spirit of world-wide human development.

This invention utilizes protein sources from other ingredients or cereal grains such as gluten from wheat protein and soya protein as well as egg proteins and casein of milk proteins within the starch based cereal recipe, so that the end result will be crunchier pieces which are also more stable to moisture migration. By combining both the high proteins in the cereal recipe along with the cold-water soluble coating having the taste of milk combined with vitamins and minerals, the end product is a breakfast cereal which is stable within a packaging system and the surface of which solubilizes upon mixing the cereal with cold or warm water. The consumer then will be able to eat such product anywhere he or she can find water, thus making it also a good source of baby food for weaning children if the particulate of the cereal is ground before preparation.

The unique nature of this product is that the cereal pieces, whether flakes, crispy rice, O's, or any other form, if it contains a higher level of protein within the main recipe, will carry a higher initial crunch texture than common cereals, as well as having a longer bowl life in cold water, thus making

the consumption of the cereal more attractive and highly beneficial for the consumer.

Accordingly, the present invention is a coated cereal product including a dry cereal having a coating, said coating including: an effective amount of a water soluble adhesive, and an effective amount of a water soluble powder derived from milk powder, powdered soya milk, protein sources and mixtures thereof, wherein the coated cereal product mimics the appearance and taste of milk with cereal when cold water is added thereto and wherein the coated product provides a complete nutritional balance on consumption.

DETAILED DESCRIPTION

It was difficult until now to achieve the above desired characteristics within a cereal system, due to low water content and low water activity present in common cereals. Because of this, any coating added to the surface had to be in a slurry form, or an adhesive such as water or oil was added to maintain the coating until it was dried for a second time and reduced the water activity of the total cereal to a shelf-stable condition. We have found that by preferably starting with high protein cereal (12% and up) within the initial recipe, the cereal particulates are more resistant to water activity, and thus do not readily absorb moisture from the surroundings. This allows the cereal to be sprayed with a water soluble adhesive such as carboxymethyl cellulose (CMC), or various gums and hydrocolloids, such as guar gum, xanthan, gum arabic, etc. either in a slurry form containing water and part or all of the coating compound, or by coating the surface of the cereal piece followed by powdering the sticky surface with the coating compound. The adhesive preferably has a water activity of less than 0.75 and is applied hot. This allows the water activity at the surface of the cereal to remain at lower values, thus allowing the adhesive to be dried slowly at low temperatures without changing the characteristics of the components of the surface coating (such as denaturation of the proteins) until the cereal is totally dried at low temperatures to the desired and stable condition. The lower water activity within the slurry that carries the solids containing the various components of the coating is due to the matrix formed by the various gums and hydrocolloids affixed to the surface of the cereal, thus releasing the water to higher temperature air during drying rather than to the cereal base.

I have also found that sugars and syrups are preferred as adhesives in complying with the above required conditions. The sugars or syrups are applied in a slurry by a hot spray method onto the dried cereal. Particularly useful are corn syrup or molasses. The powdered coating is then added onto the adhesive.

The drying technique of such cereals is also important in the protection of the solubility of the protein coating in water. If the temperature of the drying is not considered and is at high settings (beyond 185° F.), then the effect on the solubility of the proteins becomes greater, causing insolubility within the water medium during consumption. The total water activity of the cereal and the coating at the time of packaging should be below 0.52. Under this condition, the total water content of the coated piece, i.e., product, may be within 2-8%. This level of water within the cereal mandates that, after the production of the cereal, it needs to be dried or even toasted to keep the water content of the system at very low levels so that when the coating is introduced to the surface, the remaining drying which is being conducted will remove the moisture from the surface of the cereal and exclusively from the coated material. This step allows the

3 coating to adhere to the surface of the cereal very tightly, and only to be released when the moisture is introduced at high levels.

If care is not taken to coat and dry the cereal as outlined in the above steps and conditions, the resulting product will end up in a soggy condition after it is packaged, and the migration and release of the moisture, either within the cereal itself or from the coating to the cereal, will become apparent and affect the texture of the final product.

Processing techniques for manufacturing breakfast cereals are well known. The purpose of the present description is to specify the unique manner whereby the recipe of the cereal being manufactured using, for example, an extrusion system, incorporates proteins, carbohydrates, sugars, fats, and fibers from various sources, such as from legumes (for example soya, peanuts, sweet peas and the like) or cereals such as wheat, corn, barley, rice, oat, and the like, or tubers such as potatoes, or any other types of proteins, may be applied to this product and not mentioned in the above listing or the modification of the above ingredients whether chemically, mechanically, thermally or electromagnetically. The cereal is produced with specific formulations incorporating one or more of the above sources with proteins from 1-28%, sugars from 1-20%, carbohydrates from 30-85%, fats from 0.5-8%, fibers from 0.5-16% and other matter modified or hydrolyzed from any of the above sources at ranges from 0-65% by dry weight basis. Optionally, liquids made of fats, oils and other hydrophobic materials may be applied to isolate the cereal from the surface coating of a cold-water soluble coating. The cereal is then toasted and/or dried to moistures of less than 5% by weight. An adhesive such as maltodextrin, or gum solutions, or any compound or compounds possessing adhesive characteristics and having a low water activity of approximately 0.75 or less is then added to the surface of the dried or toasted cereal. The cereal surface can be further toasted and dried, followed by application of the cold-water soluble powder or slurry derived from various sources such as powdered soya milk, milk powder, or a mixture of various protein sources, emulsifiers, and/or whiteners possessing liquid-milk-mimicking characteristics when water is added. The cereal is then further dried with high volume air flowing dryers at low temperatures of 130°-195° F. The final product is then packaged after it has reached room temperature.

Alternatively a slurry containing adhesive and the water soluble powder may be spray coated on the dried or toasted cereal.

The type of protein and other cold-water soluble compounds applied to the surface may be chosen from types of ingredients that do not change the solubility of the coating ingredient powder when it is subjected to the final drying temperatures cited above. The ingredients for such a coating, including whiteners, may include some or all of the following: sodium caseinate, partially hydrogenated soybean oil, corn syrup solids, dipotassium phosphate, mono- and diglycerides, lecithin, soy protein isolate, cocoa powder, dried honey, powdered almond butter, pectin, bran (corn, soya, rice, etc.), soya flour, maltodextrin, skim milk powder, cellulose gel, non-fat dry milk, sucrose, dextrose, sodium triphosphate, calcium caseinate, modified corn starch, carageenan, artificial or natural flavors, fructose, gum arabic, egg white. Thickening agents may also be added to the surface coating so that, at the time of consumption with water, the coating forms a slightly thicker consistency than water thus giving the mouth-feel and the texture of milk and cereal. Minerals and vitamins combined with the coating may include calcium carbonate, magnesium phosphate,

potassium chloride, calcium phosphate, sodium ascorbate, vitamin E acetate, niacinamide, zinc sulfate, calcium pantothenate, ferrous sulfate, beta carotene, vitamin A palmitate, magnesium sulfate, copper gluconate, pyridoxine, hydrochloride, riboflavin, thiamine hydrochloride, folic acid, biotin, sodium molybdate, potassium iodate, chromium chloride, sodium selenate, phytylquinone (vitamin K1), vitamin B12 (cyanocobalamin), vitamin D3 (cholecalciferol), vitamin B6, thiamine mononitrate, folic acid, riboflavin, calcium succinate, zinc oxide, and zinc gluconate. This surface coating can also be composed of whole or partial soya milk powder, other proteins, from non-dairy sources, vitamins and minerals and appropriate whiteners, coloring agent and adhering compound to produce a cereal with soya milk for those who are lactose intolerant.

Particularly useful surface coating powders are those which are commercially available pre-formulated high protein, milk or milk-substitute powders such as for example: Super MEGAMASS® 2000 from Weider Nutrition Group, Salt Lake City, Utah; SIMILAC® powdered formulas, e.g. Low-Iron Infant Formula, from Ross Products Division, Abbott Laboratories, Columbus, Ohio; ULTRA SLIM FAST® in a variety of flavors, e.g. Cafe Mocha, from SlimFast Food Company, West Palm Beach, FL.; and ENFAMIL® products, e.g. Next Step™, from Mead Johnson Nutritional, Evansville, Ind.

The surface coating may have to be reapplied a number of times in order to accumulate enough water-soluble powder so that, when water is added, the product will have the appearance of liquid-milk-containing cereal.

The recipe for the powder coating can be formulated in such a manner as to be considered full-fat, low-fat, and no-fat to result in a cereal with a milk-like coating which is full-, low-, or no-fat in content.

Such products, with the appropriate coatings and being nutritionally balanced, are formulated in such manner that if the product is fine ground after final drying, it can be consumed in a porridge or liquid drink by the addition of high amounts of water to the powder in order to dilute the product. It can then be consumed in such manner, with a relatively low viscosity of approximately 50 centipoise at water content of 5:1 parts of fine grind. The addition of cocoa and other flavorings can produce a final product which is suited to a given taste preference, such as chocolate milk, strawberry flavoring, peach, berry, and even coffee or tea flavoring.

The present invention as above-described provides the following features, advantages and benefits:

A traditional cereal made for human consumption with a formulation containing high amounts of proteins from single or various sources, thus giving a harder texture to the traditional cereal and making the final product less absorbent to water. The total protein content of the cereal can be from 1-18% based on the dry weight.

A coated cereal with an adhesive to cause the powder or the liquid being applied to the surface to hold onto the abundant amount of compounds needed to color the water added to the product, which will mix and dissolve in water giving the appearance, texture and taste as well as color of milk, and will contain enough compounds necessary to add a milk-like flavor and mouth-feel to the total cereal during consumption, wherein the coated cereal will provide a complete nutritional balance for the consumer based on the consumption of regular cereal and milk.

A cereal with the consistency of cereal in milk, in color, or flavor or mouth-feel, or all or some of the above characteristics when water is added to the cereal in the bowl.

A cereal in water which can be used as a nutritional food for humans and infants because the coating can contain additional vitamins and minerals to fit the specified target.

A cereal which maintains its texture in water and releases the water-soluble coating into the water within a very short time of a few seconds to a few minutes.

A coated cereal that can be heat treated after water is added to the bowl in order to produce a porridge that is high in nutrition and soft in texture and high in proteins, vitamins and/or minerals.

A product which can be ground to powder and used as a food supplement and/or complete nutritional food for diets.

A specific cereal coated with a soya milk base incorporating vitamins and minerals, whiteners, and adhering agents for those who are lactose intolerant.

A coated cereal that can be formulated in such a manner that it can be considered full-fat, low-fat, or no-fat, resulting in a cereal with a milk-like coating which is full-, low-, or no fat content.

Other flavorings and colorants, natural or artificial, may be added to produce a final product which becomes a cereal in milk with cocoa or various fruits, such as strawberry, peach or other sources/flavors, such as coffee, tea or shakes, as well as candy flavorings such as bubble gum, candy-cane, candy apple, and the like.

We claim:

1. A coated cereal product comprising:

a dry cereal having a coating;

said coating comprising

an effective amount of a water soluble adhesive, and an effective amount of a water soluble powder consisting of powdered soya milk, protein sources and mixtures thereof, wherein the coated cereal product mimics the appearance and taste of milk with cereal when cold water is added thereto, and wherein the coated product provides a complete nutritional balance on consumption and has a protein content from about 1 to 18% based on the dry weight.

2. The product of claim 1 wherein the coating comprises: from about 0.5 to 1.5 wt-% of the adhesive, based on the total cereal product; and

from about 1 to 15 wt-% of the water soluble powder.

3. The product of claim 1, wherein the dry cereal has a protein content of at least 12% based on the dry weight.

4. The product of claim 1 wherein the adhesive is a water soluble member selected from the group consisting of maltodextrin, sodium alginates, propylene glycol alginates, guar gum, locust bean gum, gum arabic, pectin, kappa carageenan, carboxymethylcellulose, methylcellulose, hydroxypropyl methylcellulose, xanthan, hydrocolloids, and mixtures thereof.

5. The product of claim 1, wherein the adhesive is a sugar or syrup.

6. The product of claim 5, wherein the adhesive is corn syrup.

7. The product of claim 1, wherein the coating further comprises vitamins, minerals, colorants, flavorings, and mixtures thereof.

8. The product of claim 1, wherein the water activity of the coated cereal is less than 5.2 Aw.

9. The product of claim 1, wherein the coating comprises from about 0.5 to 1.5 wt-% water soluble adhesive, and from about 1 to 15 wt-% of a powdered soya milk and non-dairy protein sources.

10. The product of claim 1, wherein the dry cereal comprises:

1-28 wt-% protein;

1-20 wt-% sugars;

30-85 wt-% carbohydrates;

0.5-8 wt-% fats; and

0.5-16 wt-% fibers.

11. The product of claim 1, wherein the coating further comprises an amount of fat sufficient to mimic a low-fat or full-fat cereal and milk when water is added to the cereal product.

12. A food supplement comprising the coated cereal of claim 1 in ground or powder form.

68

(19) United States
(12) Patent Application Publication (10) Pub. No.: US 2001/0008646 A1
Hansa et al. (41) Pub. Date: Jul. 19, 2001

(54) MODIFIED OAT AND CORN GRIT PRODUCTS AND METHOD

(76) Inventors: James D. Hansa, Algonquin, IL (US),
Alice H. Hibbs, Crystal Lake, IL (US),
Donald Kent Salisbury, Barrington, IL (US)

Correspondence Address
RYNDAK & SCHWARTZ
Suite 2630
30 N. LaSalle Street
Chicago, IL 60602 (US)

(21) Appl No 09/738,480

(22) Filed Dec. 15, 2000

Related U.S. Application Data

(62) Division of application No 09/487,036, filed on Jan 19, 2000

Publication Classification

(51) Int. Cl.⁷ A23L 1/168, A23L 1/27
(52) U.S. Cl. 426/93, 426/251, 426/74, 426/619

(57) ABSTRACT

A coated, uncooked oat product is provided that has no added fat and comprises uncooked oat flakes having a

coating adherent to the oat flakes. A coated, oat flake agglomerate is also provided, wherein each agglomerate comprises at least two uncooked oat flakes and has a fat-free coating. A flavored, coated oat product in bulk and a flavored, coated, agglomerated oat product are provided, both of which products have flavors uniformly distributed throughout the bulk. Corn grit products are also provided and include (1) individual pieces of corn grit having a fat-free coating and (2) clusters of corn grit pieces having a fat-free coating.

A method of coating uncooked oat flakes with a desired fat-free coating to form the coated, uncooked oat product is also provided. The method involves feeding uncooked oat flakes into a circulating drum, coating the oat flakes by spraying the oat flakes with a stream of coating material, drying the coated oat flakes until the oat flakes have attained the desired moisture content, and cooling the coated oat flakes.

Also provided is a method of forming uncooked oat flake agglomerates having a fat-free coating. This method involves essentially the same steps as the above-described method. However, in the coating step of this method, the coating material sprayed onto the oat flakes comprises a binding material that allows the oat flakes to form agglomerates of at least two oat flakes.

Also provided is a method of preparing the desired coating material.

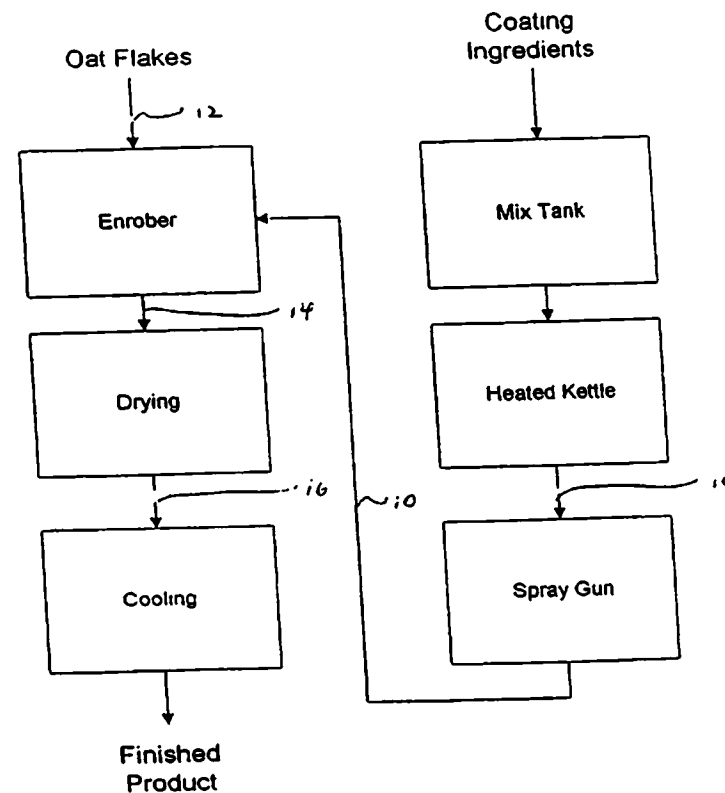
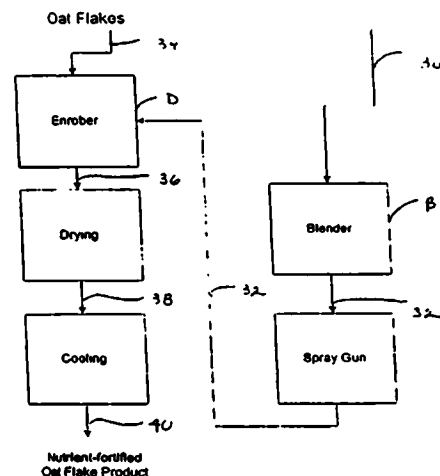


FIG. 1

68

FIG. 2A

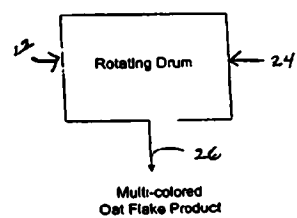
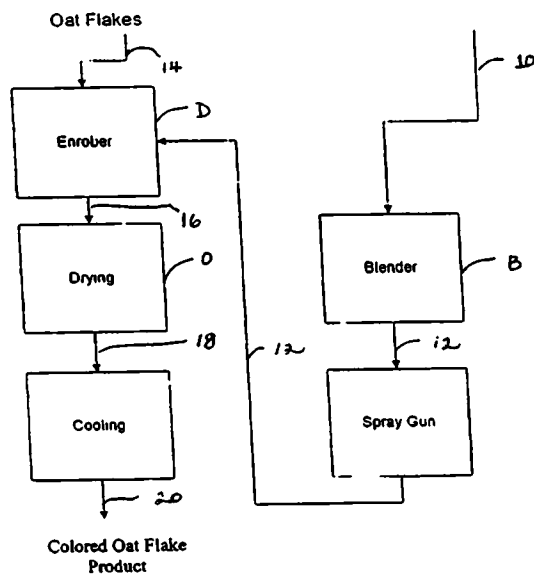


FIG. 2B

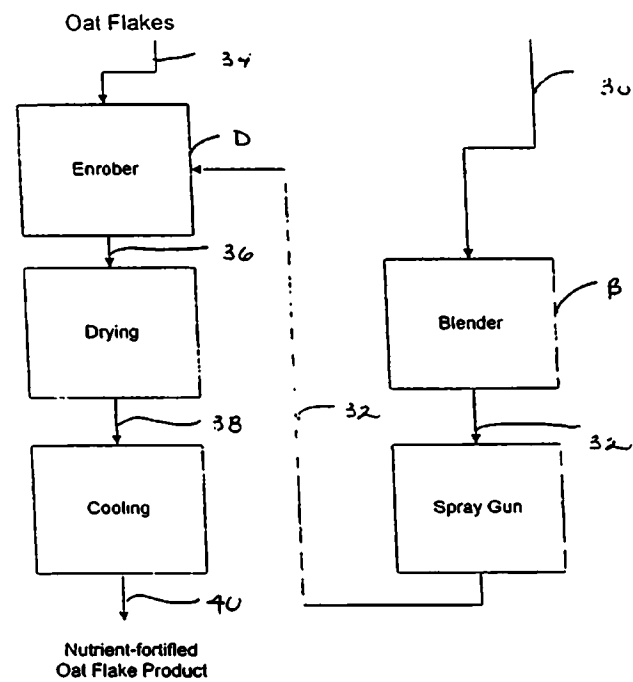


FIG. 3

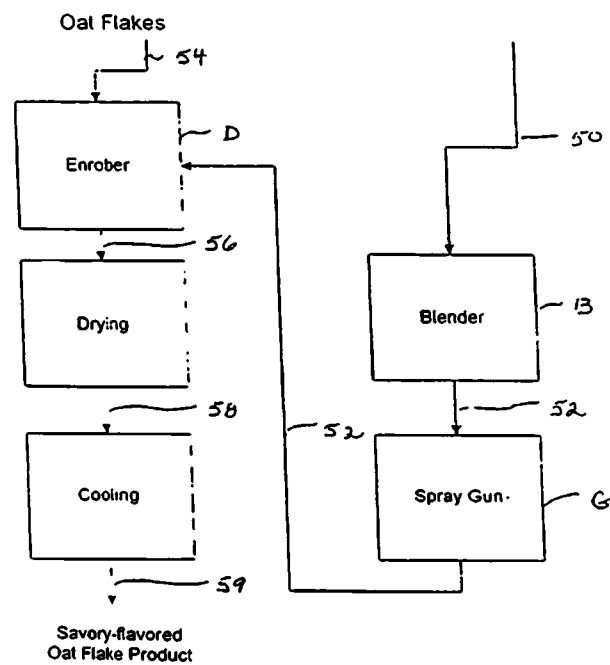


FIG. 4

Bulk Packaged, Clustered Oat Flake Product

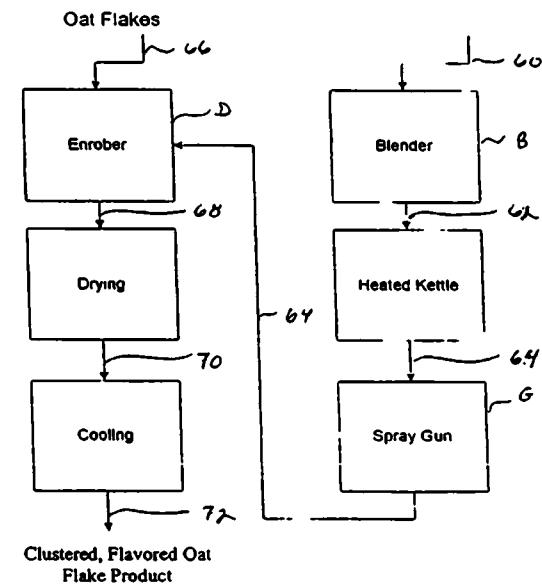


FIG 5

Nonclustered, Flavored Oat Flake Product

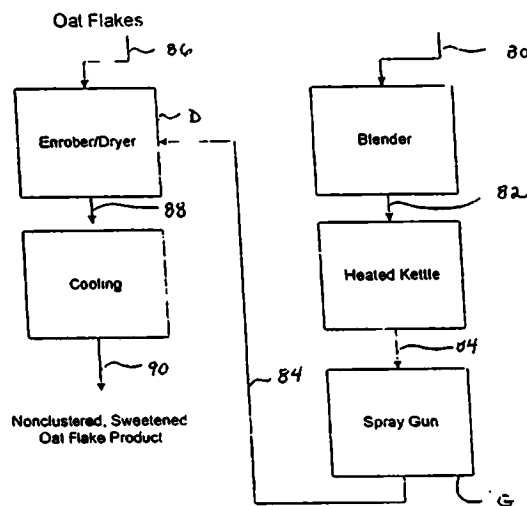


FIG 6

MODIFIED OAT AND CORN GRIT PRODUCTS AND METHOD

FIELD OF THE INVENTION

[0001] This invention relates to coated, uncooked flaked oat products and methods of making such oat products. More particularly, the present invention relates to (1) an oat product comprising coated, uncooked oat flakes and having a fat-free coating adhered to the oat flakes, (2) an agglomerated oat product comprising coated, uncooked oat flakes and having a fat-free coating adhered thereto, (3) a flavored oat product in bulk comprising oat flakes coated with a fat-free coating, and (4) a flavored oat product in bulk comprising oat flake agglomerates having a fat-free coating.

[0002] This invention also relates, in particular, to methods of making the coated, uncooked oat flake product, the agglomerated, coated oat flake product, and the coating.

BACKGROUND OF THE INVENTION

[0003] Cereal manufacturers today are faced with the ever-increasing challenge of producing flavorful yet nutritious products that appeal to consumers. Nutritionally, compared with other grains, oats offer a high concentration of protein, a good distribution of amino acids, and fiber. Oat groats—the component of oats that is used to form oat flakes (also termed “flaked oats” herein)—reportedly have a high protein concentration in the range of about 13.8% to 25.5%. See Oat, Ch. 10 by V. L. Young and R. A. Forsberg, in “Nutritional Quality of Cereal Grains: Genetic and Agronomic Improvement,” pp. 466-475, published by the American Society of Agronomy, Inc., Madison, Wis. (1987). Moreover, the amino acid composition of oat protein is good compared to other grains. Although lysine is the major limiting amino acid in oats, oats still have a higher concentration of this amino acid than is typically found in other grains. Further, rolled oat groats are a good fiber source as they contain about 1.1% crude fiber and thus provide 0.3 grams of crude fiber per ounce of rolled oat groats.

[0004] Various oat-based products—namely, granola—have been produced which take advantage of the high nutritional profile of the oat grain. However, because these products are produced via a baking process, they tend to have a relatively hard texture. For that reason, granola-based products are formulated to contain at least about 3 to 7 grams of fat per about 55 grams of finished product, wherein the fat imparts a tender texture to the product. Further, in the packaged granola product, the coating material tends to chip or fall off the baked granola product and settle at the bottom of the package. As a result, it is virtually impossible to obtain a uniform bulk-packaged oat-based granola product.

[0005] Thus, there exists a need for an uncooked, oat product comprising oat flakes and having a coating adhered to the oat product which contributes no added fat to the finished oat product. There also exists a need for an agglomerated oat product comprising agglomerated uncooked oat flakes having a fat-free coating adhered to the uncooked oat flakes. Further, there exists a need for methods for making both of the aforesaid, inventive oat products.

SUMMARY OF THE INVENTION

[0006] In accordance with one aspect of the present invention, a coated, uncooked oat product is provided that has no

added fat and comprises uncooked oat flakes having a coating adhering to the surface of the oat flakes. The coating comprises at least one material selected from the group consisting of colors, flavors, nutrients, and sweeteners. Typically, the coating comprises from about 0.1% to about 60% by weight, on a dry weight basis of the uncooked oat product. On a dry weight basis, the concentration of the coating is preferably in the range of from about 5% or 20% to about 50% by weight of the uncooked oat product and most preferably, in the range of from about 35% to about 45% by weight, on a dry weight basis of the uncooked oat product.

[0007] In accordance with another aspect of the present invention, an uncooked oat product is provided comprising a coated, oat flake agglomerate, wherein each agglomerate comprises at least two uncooked oat flakes and has a fat-free coating, as described above. In such product, the coating comprises from about 20% to about 60% by weight, on a dry weight basis of the oat flake agglomerate. Preferably, on a dry weight basis, the coating accounts for about 35% to about 45% by weight of the oat flake agglomerate.

[0008] In accordance with still another aspect of the present invention, a corn grit product is provided comprising individual pieces of corn grit coated with the aforesaid material which contains no added fat. The grits are: unflaked and may be either cooked, partially cooked, or uncooked. Additionally, the coated corn grits may be clustered in form coated clusters of corn grits in accordance with the invention. The resulting products may be used as hot cereals.

[0009] In accordance with still another aspect of the present invention, a method of coating uncooked oat flakes with a desired fat-free coating is provided. The method involves feeding uncooked oat flakes into a circulating drum, coating the oat flakes by spraying the oat flakes with a stream of coating material, drying the coated oat flakes until the oat flakes have attained the desired moisture content, and cooling the coated oat flakes. The method is additionally applicable to coating individual pieces of cooked or partially cooked corn grits.

[0010] In accordance with still another aspect of the present invention, a method of forming coated, uncooked oat flake agglomerates is provided. This method involves essentially the same steps as the aforesaid method for coating uncooked oat flakes. However, in the coating step of this method, the coating material sprayed onto the oat flakes comprises a binder material that allows the oat flakes to form agglomerates of a plurality which may be two, three, four or more flakes and typically less than about 20 or 40 flakes. The method can also be used to form clusters of cooked or partially cooked corn grits.

[0011] Still another aspect of the invention relates to a method for preparing the desired coating material in solution and/or dispersion form which comprises mixing together at least one component selected from the group consisting of colors, flavors, nutrients, and sweeteners with water to form a coating mixture, and optionally heating the coating mixture to elevated temperature, which can be about 140° F., for example, to dissolve and/or disperse the components of the mixture and form the coating material.

[0012] In accordance with still another aspect of the invention, a flavored oat product in bulk is provided,

wherein the oat product in bulk comprises uncooked oat flakes individually coated with a fat-free coating that is substantially uniform in its distribution throughout the product. Alternatively, the coating can contain fat, if desired. Also in accordance with the invention is a flavored oat product in bulk comprising uncooked, oat flake agglomerates of at least two oat flakes having a fat-free coating. The coating on these two bulk products includes at least one material selected from the group consisting of colorants, flavors, nutrients, and sweeteners and is uniformly distributed throughout the oat product in bulk. The substantially uniform distribution of the coating ensures a consistent bulk-packaged product.

[0013] Thus, the inventive coated oat flake product, the coated oat flake agglomerated product, the flavored oat product in bulk, the flavored agglomerated oat product in bulk, and the methods for making such products address the need for a grain product that utilizes the high protein content of oats contains no added fat, no significant amount of added fat, or added fat as desired, and provides consistent product quality as the product coating does not chip or fall off the oat product, and exhibits good adherence to the uncooked grain or oat flake.

[0014] Products in accordance with the invention can be utilized as a hot cereal (with added milk or water and heat), a ready-to-eat cereal (with the addition of milk) or a snack (i.e., consumed directly from the container without further preparation).

[0015] Other advantages and features of the invention will become apparent from the following description and from reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 is a flow chart illustrating a method of coating oat flakes with a fat-free coating material in accordance with the invention.

[0017] FIG. 2 is a flow chart illustrating a method of coating oat flakes with colorant-containing coating material in accordance with the invention.

[0018] FIG. 3 is a flow chart illustrating a method of coating oat flakes with nutrient-containing coating material in accordance with the invention.

[0019] FIG. 4 is a flow chart illustrating a method of coating oat flakes with a butter and salt-flavored coating material in accordance with the invention.

[0020] FIG. 5 is a flow chart illustrating a method of forming clustered, flavored oat flakes containing a vitamin/mineral premix, in accordance with the invention.

[0021] FIG. 6 is a flow chart illustrating a method of forming nonclustered, sweetened and flavored oat flakes in accordance with the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0022] This invention includes all alternatives, modifications, and equivalents that may be encompassed within the spirit and scope of the invention, as defined by the appended claims. The invention is not limited to the embodiments described herein in accordance with the invention, any

source of oat flakes can be used and any suitable process can be used to make oat flakes or flaked oats. It is also to be understood that in accordance with the invention, any suitable cooking or partial cooking technique can be used to make corn grits. Corn grits can be obtained from corn in any manner known to those skilled in the art and in any desired size range. Throughout the following description, like numerals and letters refer to like parts or steps.

[0023] In accordance with the present invention, an uncooked oat product is provided which comprises uncooked, individual oat flakes having a coating that imparts no added fat to the finished product. The coating comprises at least one material selected from the group consisting of colorants, flavors, nutrients, and sweeteners. The coating, applied so it is substantially uniformly distributed over the surface of the oat product, preferably comprises from about 0.1% to about 60% by weight, on a dry weight basis of the uncooked oat product. More preferably, the coating comprises from about 20% to about 50% by weight, on a dry weight basis, of the uncooked oat product. Most preferably, the coating comprises from about 35% to about 45% by weight, on a dry weight basis of the uncooked oat product. Preferably, the aforementioned inventive product is packaged in a bulk quantity.

[0024] Vitamins, minerals, natural nutrients and sweeteners may be added to the coating material if desired. Typically, vitamins are selected from the group consisting of, for example, vitamin A, beta-carotene, thiamin, riboflavin, niacin, vitamin B₆, vitamin B₁₂, vitamin C, vitamin D, vitamin E, folic acid, and derivatives and mixtures thereof. Minerals are generally selected from the group consisting of, for example, calcium, copper, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, zinc, and derivatives and mixtures thereof. Natural nutrients are selected from the group consisting of, for example, Echinacea extract, ginkgo biloba extract, ginseng, bee pollen, St. John's wort extract, and mixtures thereof. Sweeteners are generally selected from the group consisting of, for example, sugar, fructose, honey, corn syrup, molasses, fruit juice, artificial sweeteners, and mixtures thereof.

[0025] In accordance with another aspect of the invention, the aforementioned, inventive oat product is provided wherein the oat product comprises a mixture of a plurality of coated oat flakes being of a first color and a plurality of other coated oat flakes being of a second color, distinct from the first color. The colors are provided by water-soluble colorants present in the coating on the oat flakes. When the oat product is placed in contact with an aqueous medium, such as milk or water, the colorants in the coatings of the different colored oat flakes become dissolved or dispersed and combine in the aqueous medium to form a new color as the aqueous medium, distinct from either the first or second colors. Thus, pursuant to this embodiment, the flaked oat product forms a third, new color (i.e., green) where the first color is, for example, yellow and the second, blue, (i.e., orange) where the first color is red and the second, yellow, or (i.e., purple) where the first color is red and the second, blue, for example.

[0026] In accordance with another aspect of the invention, an uncooked, oat product is provided which comprises agglomerated, uncooked flaked oats having a coating that is applied over the surface of the flaked oats and that contrib-

utes no added fat and remains adhered to the individual flaked oats. Typically, each agglomerate comprises at least two uncooked oat flakes. The agglomerates range in size "small" agglomerates have from two to ten flakes and more typically from five to ten flakes, whereas "large" agglomerates generally comprise more than ten oat flakes and, more typically, from 20 to more than 40 oat flakes.

[0027] Typically, the coating applied to the oat flake agglomerates comprises at least one material selected from the group consisting of colorants, flavors, nutrients, and sweeteners, which are the same constituents used in the coating that is applied to the coated uncooked oat flakes previously described. In addition, the coating comprises a binding material selected from the group consisting of sugar, fructose, honey, corn syrup, molasses, fruit juice, hydrocolloids, maltodextrin, corn syrup solids, and mixtures thereof, for example. The nutrients included in the coating of the agglomerated oat product generally are compounds selected from the group consisting of vitamins, minerals, natural nutrients, and mixtures thereof, as previously described.

[0028] On a dry weight basis, the coating preferably accounts for from about 20% to about 60% by weight of the oat flake agglomerate and most preferably from about 35% to about 45% by weight of the oat flake agglomerate. Preferably, the agglomerated oat flake product is packaged in a bulk quantity.

[0029] In another embodiment of the present invention, the agglomerated, uncooked flaked oat product comprises a mixture of a plurality of colored, coated oat flakes of a first color and a plurality of colored, coated oat flakes of a second color. As described above, the oat product is placed in contact with an aqueous medium, such as milk or water, and the colorants in the coatings of the different colored oat flakes become dissolved or dispersed and combine in the aqueous medium to form a new color as the aqueous medium, distinct from either the first or second colors. Thus, pursuant to this embodiment, the flaked oat product forms a third, new color (i.e., green) where the first color is, for example, yellow and the second, blue, (i.e., orange) where the first color is red and the second, yellow, or (i.e., purple) where the first color is red and the second, blue, for example.

[0030] In yet another aspect of the invention, uncooked, flaked oat product comprises a mixture of a plurality of colored, coated oat flakes of a first color and a plurality of colored, coated oat flakes of a second color. As described above for the non-agglomerated oat product, the colors are produced by water-soluble colorants present in the coating, which coatings are preferably applied in a substantially uniform manner over the surface of the oat flakes. When the agglomerated, uncooked flaked oat product is placed in an aqueous liquid, such as milk or water as examples, and the colorants become hydrated, the combination of the colorants forms a new color, distinct from the first and second colors. For example, a new color is produced when the first color is yellow and the second, blue; when the first color is red and the second, yellow; or when the first color is red and the second, blue.

[0031] Also in accordance with the invention, an unflaked corn grit product is provided wherein individual pieces of corn grit are coated with the aforementioned coating material in the inventive product, the coating typically will comprise

from about 0.1% to about 40% by weight on a dry weight basis of the coated corn grit. Typically, after isolating from corn the grits to be processed in accordance with the invention, the grits are cooked, partially cooked, or uncooked. Generally, cooked or partially cooked grits would be heated and cooked prior to consumption. One known technique for cooking grits is to hydrate the grits with water and steam. Thereafter, the grits can be dried, for example, by a drum-drying step or any other suitable means known to those skilled in the art. After the grits are cooked, the cooked grits can be coated in accordance with the invention and packaged until the time of their intended use. Although not necessary, the uncooked, coated grits would be cooked prior to consumption.

[0032] Another aspect of the invention is a cluster of corn grit pieces coated with the aforementioned coating material. In each corn grit cluster, the coating typically will comprise from about 0.1% to about 40% by weight on a dry weight basis of the corn grit cluster. Typically, the coated corn grit clusters comprise at least two individual pieces of corn grit and, more typically, from about 3 to about 20, 50, or 100 or more pieces of corn grit.

[0033] In another embodiment, both inventive corn grit products—the individually coated corn grit product and the corn grit cluster product—each comprise a mixture of a plurality of coated corn grit pieces of a first color present in the coating and a plurality of other coated corn grit pieces of a second color. As described above, the colors are produced by water-soluble colorants present in the coating. When the mixture of coated corn grits is placed in an aqueous medium such as milk or water, as examples, the colors combine to form a new, third color in the aqueous medium.

[0034] In another embodiment of the invention, a method is provided for preparing the fat-free coating material for application onto either individual uncooked oat flakes or single corn grits, comprising (i) mixing at least one component selected from the group consisting of colorants, flavors, nutrients, and sweeteners with water to form a coating mixture, and (ii) optionally heating the coating mixture at an elevated temperature, for example, from about 100° to 160° F., and preferably to about 140° F., to dissolve or disperse the components of the coating mixture and form the coating material.

[0035] Also in accordance with the invention is a similar method of preparing a coating material for application onto either oat flake agglomerates or corn grit clusters. This method generally comprises (i) mixing a binding material with water and at least one component selected from the group consisting of colorants, flavors, nutrients, and sweeteners with water to form a coating mixture, and (ii) optionally heating the coating mixture to elevated temperature sufficient to dissolve or disperse the components of said coating mixture and form said coating material.

[0036] In FIG. 1, a flow chart illustrates the steps involved in a method of coating uncooked flaked oats with a desired, fat-free coating material in accordance with the present invention. The method comprises (i) feeding uncooked oat flakes, shown at stream 12, into a rotating drum, (ii) coating the oat flakes by spraying the oat flakes with a stream of the coating material, shown as stream 10, until the coating material is applied over the surface of the oat flakes in a substantially uniform manner, (iii) drying the coated oat

flakes, shown as stream 14, until the coated oat flakes attain a desired percentage of moisture, and (iv) cooling the dried, coated, uncooked oat flakes, shown as stream 16, if processed at an elevated temperature. The method also has application for coating individual pieces of corn grit with a fat-free coating.

[0037] Typically, the coating and drying steps can be achieved by any suitable means known to those skilled in the art, for example, coating can be achieved by an enrober or rotating drum, and drying, by a continuous belt dryer or a fluidized bed, forced air dryer. Because such devices are well known to those skilled in the art, a detailed disclosure of such equipment is not provided. Generally, the coated oat flakes are dried at a temperature in the range of from about 100° F to about 500° F and more typically 150-350° F and preferably to a moisture content of from about 3-14% and more typically 4-12%, on a dry weight basis. The coated corn grits are dried at a temperature in the range of from about 100° F to about 500° F and to a moisture content of about 1-14% and more typically about 5-7%, on a dry weight basis. The coating and drying steps preferably take place simultaneously.

[0038] This method efficiently distributes the coating in a substantially uniform manner over the surface of the flaked oats or corn grits so that the coating adheres to the surface of the uncooked flaked oats or corn grits and does not readily chip or fall off the product. The resulting product is thus ideally suited for bulk packaging since the coating material will not separate into a separate phase or settle to the bottom of a container.

[0039] In accordance with the present invention, typically the coating material is applied to the uncooked oat flakes at a concentration of from about 0.1% to about 60%, on a dry weight basis by weight of the coated oat flakes. Preferably, on a dry weight basis, the coating material is applied to a concentration of from about 35% to about 50% of the weight of the coated oat flakes. Preferably, with respect to corn grits, the coating is applied, on a dry weight basis, to a concentration of from about 5% to about 40% by weight of the coated corn grits.

[0040] Another aspect of the present invention is a method of forming coated, uncooked oat flake agglomerates that have no added fat. The method comprises (i) feeding uncooked oat flakes into a rotating drum, (ii) coating the surface of the oat flakes by spraying the oat flakes with a stream of a coating material comprising a binding material until the oat flakes form agglomerates, each oat flake agglomerate comprising at least two flakes, (iii) drying the oat flake agglomerates to a desired percentage of moisture, and (iv) cooling the coated, oat flake agglomerates if processed at an elevated temperature. Typically, the coating material is applied at a concentration of from about 20% to more than 60%, on a dry weight basis by weight of the coated oat flake agglomerates. This method is also applicable to the formation of clusters of coated corn grit, wherein the concentration of the coating material is, on a dry weight basis, about 0.1% to about 40% or more, by weight of the coated corn grit.

[0041] The coated oat flake agglomerates typically are dried at a temperature in the range of from about 100° F to about 500° F and to a desired moisture level, generally in the range of from about 3% to 14% and more typically from

about 4-12% on a dry weight basis. The coated corn grit clusters typically are dried at a temperature in the range of from about 100° F to about 500° F and to a desired moisture level, generally in the range of from about 1% to about 14% and more typically about 5-7% on a dry weight basis. Drying may be done by any suitable drying means known to those skilled in the art, including, for example, a continuous belt dryer or a fluidized bed, forced air dryer.

[0042] In accordance with the invention, a flavored oat product in bulk is provided, having flavors uniformly distributed throughout the product in bulk. The flavored oat product in bulk comprises uncooked, coated flaked oats having a coating adhered to the flaked oats, where the coating contributes no added fat, or added fat as desired, and includes at least one flavoring component and at least one material selected from the group consisting of colorants, nutrients, and sweeteners, as these are defined above. Typically, the coating material is present on the flaked oats at a concentration of from about 0.1% to about 60% on a dry weight basis of the flavored oat product. Preferably, on a dry weight basis, the coating material has a concentration of from about 20% to about 50% by weight of the flavored oat product, and most preferably at a concentration of from about 35% to about 45% by weight of the flavored oat product.

[0043] Typically, the flavored oat product in bulk comprises a mixture of a plurality of coated oat flakes of a first color and a plurality of other coated oat flakes of a second color, distinct from the first color. The color is provided by water-soluble or dispersible colorants present in the coating of the oat flakes. When the flavored bulk oat product is placed in an aqueous liquid, the colorants dissolve, or disperse, and combine in the liquid to produce a new color in the liquid where the new color is different from the color of the dry oat flakes. For example, the colorant produces a new, third color when the first color is yellow and the second, blue, when the first color is red and the second, yellow, and when the first color is red and the second, blue.

[0044] Another embodiment of the present invention features a flavored oat product in bulk comprising agglomerated, coated, uncooked flaked oats. Each agglomerate comprises at least two uncooked oat flakes. The agglomerates range in size: "small" agglomerates have from two to ten flakes and more typically from five to ten flakes, whereas "large" agglomerates generally comprise more than ten oat flakes and, more typically, from 20 to more than 40 oat flakes. Typically, the agglomerated, flavored oat product in bulk comprises a coating that contributes no added fat to the finished product and that adheres to the uncooked flaked oats. Preferably, the coating includes at least one material selected from the group consisting of colorants, flavors, nutrients, and sweeteners, as these materials are described above. On a dry weight basis, the coating generally comprises from about 20% to about 60% by weight of the flavored, agglomerated, bulk oat product, and preferably from about 35% to about 45% by weight of such product. The substantially uniform distribution of coating on the flavored bulk oat product ensures a uniform distribution of flavors throughout.

[0045] In accordance with another aspect of this invention, the flavored bulk oat product is a mixture of a plurality of coated oat flake agglomerates of a first color and a plurality

of coated oat flake agglomerates of a second color, consistent with the description given above. Water-soluble or dispersible colorants present in the coatings impart the color to the coated oat flake agglomerates. When the flavored bulk oat product is placed in an aqueous liquid, the colorants cause the liquid to develop a new, third color, distinct from the first and second colors. For example, the colorants produce a green color when the first and second colors are yellow and blue, they produce orange when the first and second colors are red and yellow, and purple when the first and second colors are red and blue.

[0046] The following are examples of embodiments of the inventive method as it may be used to produce a variety of coated oat flake products or coated corn grit products.

[0047] The coating and drying steps utilize equipment that is well known to those skilled in the art. However, examples of particular systems that are suitable include a system that provides simultaneous coating and drying, designated as PSC-020 Batch Coating System, manufactured by Coating Machinery Systems, Inc. of Huxley, Iowa.

[0048] The process of the present invention can be operated as a batch or continuous process. To prevent unwanted agglomeration or clumping, the coated oat flakes can be agitated during drying and/or cooling.

EXAMPLE 1

[0049] As described below, the inventive method is suited for making a bulk-packaged, colored oat flake product that, when cooked, can be served as oatmeal.

[0050] The process, shown in FIG. 2A, commences with feeding stream 14 which can be either a batch or continuous process comprising 1 kilogram of oat flakes into a drum D rotating at a speed of 17 RPM. A coating material, designated as stream 12, is prepared by mixing stream 10 comprising 2.5 grams of, for example, red colorant (or any other colorant) with 250 grams of water in a blender B until thoroughly dispersed or dissolved. Approximately 167-250 grams of coating material, stream 12, is sprayed onto the oat flakes, and drum D is rotated until the coating material is substantially uniformly applied over the surface of the oat flakes. The coated oat flakes, shown as stream 16, can be dried either on a batch or continuous basis. The coated oat flakes are dried in dryer O at 200° F for about 1.6 minutes, 50% of which time includes exposure to a vertically directed air flow. The coated and dried oat flakes, shown as stream 18, are then cooled to a temperature of less than 110° F. The finished colored, oat flake product, shown as stream 20, typically has a moisture concentration in the range of about 9 to 12%.

[0051] This method may be used to prepare oat flakes that are virtually of any color, such as red, green, blue, yellow, orange, blue/yellow, multi-colored, and variations thereof, for example.

[0052] In another embodiment, the inventive method may be used to prepare a multi-colored oat flake product, comprising a mixture of colored oat flakes. Shown in FIG. 2B, this method involves mixing concentrations of oat flakes of a first color, shown as stream 22, with oat flakes of a second color, shown as stream 24, so as to produce a finished product, stream 26, containing a mixture of colored oat flakes in desired concentrations. For example, blue oat flakes

and red oat flakes can be mixed together in a concentration of 40/60. This embodiment is not limited to the use of only two colors of oat flakes; alternatively, three, four, five or more colors of oat flakes can be blended together to achieve a finished product with the desired color combination and concentration. Any suitable device, such as a rotating drum, may be used to blend the colored oat flakes to achieve a substantially uniformly mixed product.

[0053] Colored oatmeal may be prepared from the colored oat flake product by combining the oat flakes with a desired amount of milk or water and cooking the mixture in a suitable manner.

EXAMPLE 2

[0054] The method of Example 1 may be modified and utilized, as shown in FIG. 3, to form a nutrient-fortified oat flake product. Here, the coating material is prepared by blending 100 grams of water and 0.5 grams of the desired nutrient, shown as stream 30, in a blender B. In this case, the nutrient used is a blend of vitamins B₆, B₁₂, and folate. The coating material, shown as stream 32, is sprayed onto 1 kilogram of oat flakes, shown as stream 34, as they tumble in a drum D that is rotating at 17 RPM. The tumbling action of the oat flakes helps to uniformly disperse the coating material in a substantially uniform manner across the surface of the oat flakes. Shown as stream 36, the coated oat flakes are then spread to a depth of about 1 to 3 inches and dried at 200° F for about 2-4 minutes. Approximately 50% of the drying time utilizes a vertically directed air flow. The dried, coated oat flakes, shown as stream 38, are then cooled to a temperature of less than 110° F. The finished, nutrient-fortified oat flake product, stream 40 in FIG. 3, has a moisture concentration of about 10% in 13%.

[0055] This method may be used to fortify oat flake products with vitamin B derivatives such as vitamins B₆ and B₁₂, as well as ginseng, Echinacea extract, and ginkgo biloba extract, for example.

EXAMPLE 3

[0056] FIG. 4 shows a method for producing a savory bulk-packaged oat flake product having a butter and salt flavor. In this example, the coating material is prepared by blending ingredients, shown as stream 50, which include 7.5 grams of butter flavor, 15 grams of salt (optional), and 100 grams of water in a blender B. The coating material, stream 52, is applied with a spray gun G onto 1 kilogram of oat flakes, shown as stream 54, contained in a rotating drum D that is rotating at 17 RPM. The tumbling action of the oat flakes facilitates the distribution of the coating material so it becomes substantially uniformly distributed across the surface of the oat flakes. The coated oat flakes, shown as stream 56, are first dried to yield stream 58—a dry, coated oat flakes having a desired moisture concentration. The dried, coated oat flakes are then cooled under the same conditions given in Example 2 above. The finished oat flake product, shown as stream 59, has a moisture concentration of about 10% to 13%.

[0057] The inventive method may be used to prepare oat flake products having a variety of flavors, such as vanilla, malt, peanut butter, and caramel nut, as examples.

EXAMPLE 4

[0058] Shown in FIG. 5 is a method for producing a bulk-packaged, clustered oat flake product that has a maple,

brown sugar flavor and is suitable for consumption in any one of three ways, i.e., as a ready-to-eat cereal, a hot cereal, or a snack. The coating material is prepared by blending 621 grams of liquid sugar, 18.5 grams of brown sugar, and 5.3 grams of maple flavor with 39.1 grams of a premix comprising salt, guar gum, vitamins and minerals, these ingredients being shown as stream 60. As with the previous examples, these ingredients are typically mixed in a blender B to yield a coating mixture, shown as stream 62. After coating mixture 62 is heated to about 140° F., the resulting coating material, shown as stream 64, is applied to 1 kilogram of oat flakes, shown as stream 66, contained in a drum D rotating at 17 RPM. A spray gun G, connected to an air line having 10 psi, is used to apply coating material, stream 64, at 5 psi to the oat flakes as they tumble in rotating drum D. The coated oat flakes, shown as stream 68, are spread to a depth of about 1 to 3 inches and dried at 270° F. for about 6 minutes. For 50% of the drying time, the oat flakes are subjected to an up down air flow. The dried flakes, depicted as stream 70, are then cooled, as they are stirred, to a temperature of less than 110° F. The finished product, shown as stream 72, has a moisture concentration of about 4.9%.

[0059] Examples of other oat flake products that can be prepared via this method are brown sugar-cinnamon-flavored and coffee-flavored oat flakes, although the method can be used to apply essentially any type of flavor.

EXAMPLE 5

[0060] FIG. 6 illustrates a method for producing nonclustered, sweetened and flavored oat flakes. In this embodiment of the invention, the method features concurrent coating and drying steps. The coating material is prepared by blending 4.13 kilograms of sugar with 3.0 kilograms of water, and adding from about 19.3 to about 32.1 grams of flavor and 213.4 grams of salt. The ingredients are shown as stream 80 in FIG. 6. The mixture, shown as stream 82, is heated to about 100-160° F., and more preferably 120° F., to promote dissolution of the solids and form the coating material, shown as stream 84. A spray gun G is used to dispense about 1.27 kilograms of the coating material, shown as stream 84, under 10 psi, onto 1.82 kilograms of oat flakes that are tumbling in a rotating drum D at a speed of 12 RPM. The oat flakes are shown as stream 86. The atomizing air for spray gun G is generally in the range of about 6-12 psi, and the coating step takes about 6 minutes. The coated flakes are dried at a temperature of about 270° F. for a sufficient amount of time to achieve drying. During coating and drying, the air flow is about 850 cfm. The dried oat flakes, shown as stream 88, are then cooled for about 2.5 minutes. Shown as stream 90, the finished product has a moisture concentration in the range of about 7.5%.

[0061] As described above, this embodiment of the invention can be used to prepare nonagglomerated oat flakes coated with a variety of flavors and sweeteners, such as brown sugar, cinnamon, or maple flavors, for example.

[0062] While the invention has been described with respect to certain preferred embodiments, it is to be understood that the invention is capable of numerous changes, modifications, and rearrangements without departing from the scope or spirit of the invention as defined in the claims.

We claim

1. An uncooked oat product comprising uncooked oat flakes having a fat-free coating adhering to the oat flakes, the coating comprising at least one material selected from the group consisting of colorants, flavors, nutrients, and sweeteners.
2. The product of claim 1 wherein said coating comprises from about 0.1% to about 60% by weight, on a dry weight basis of the coated, uncooked oat product.
3. The product of claim 1 wherein said coating comprises from about 20% to about 50% by weight, on a dry weight basis of the coated, uncooked oat product.
4. The product of claim 1 wherein said coating comprises from about 35% to about 45% by weight, on a dry weight basis of the coated, uncooked oat product.
5. The product of claim 1 comprising a mixture of a plurality of coated oat flakes of a first color present in the coating of said oat flakes and a plurality of other coated oat flakes of a second color, distinct from the first color, said second color being present in the coating of said other oat flakes, said colors provided by water-soluble colorants and when said product is placed in an aqueous liquid, a new color is formed in said liquid from a combination of said first and second colors.
6. The product of claim 5 wherein the first color is yellow and the second color is blue.
7. The product of claim 5 wherein the first color is red and the second color is yellow.
8. The product of claim 5 wherein the first color is red and the second color is blue.
9. The product of claim 1 wherein said nutrients include compounds selected from the group consisting of vitamins, minerals, natural nutrients, and mixtures thereof.
10. The product of claim 9 wherein said vitamins are selected from the group consisting of derivatives of vitamin A, beta-carotene, thiamin, riboflavin, niacin, vitamin B₆, vitamin B₁₂, vitamin C, vitamin D, vitamin E, folic acid, and mixtures thereof.
11. The product of claim 9 wherein said minerals are selected from the group consisting of derivatives of calcium, copper, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, zinc, and mixtures thereof.
12. The product of claim 9 wherein said natural nutrients are selected from the group consisting of Echinacea extract, ginkgo biloba extract, ginseng, bee pollen, St. John's wort extract, and mixtures thereof.
13. The product of claim 1 wherein said sweeteners are selected from the group consisting of sugar, fructose, honey, corn syrup, molasses, fruit juice, artificial sweeteners, and mixtures thereof.
14. The product of claim 1 packaged in a bulk quantity.
15. An uncooked, oat product comprising agglomerated, flaked oats composed of at least two uncooked oat flakes and having a fat-free coating adhered to the oat flakes, said coating comprising at least one material selected from the group consisting of colorants, flavors, nutrients, and sweeteners.
16. The product of claim 15 wherein said coating comprises from about 20% to about 60% by weight, on a dry weight basis of the coated, uncooked oat flake agglomerate.
17. The product of claim 15 wherein said coating comprises from about 35% to about 45% by weight, on a dry weight basis of the coated, uncooked oat flake agglomerate.

18. The product of claim 15 wherein said agglomerate comprises from two to ten oat flakes.

19. The product of claim 15 wherein said agglomerate comprises more than ten oat flakes.

20. The product of claim 15 comprising a mixture of a plurality of coated oat flakes of a first color present in the coating of said oat flakes and a plurality of other coated oat flakes of a second color, distinct from the first color, said second color being present in the coating of said other oat flakes, said colors provided by water-soluble colorants and when said product is placed in an aqueous liquid, a new color is formed in said liquid from a combination of said first and second colors.

21. The product of claim 20 wherein the first color is yellow and the second color is blue.

22. The product of claim 20 wherein the first color is red and the second color is yellow.

23. The product of claim 20 wherein the first color is red and the second color is blue.

24. The product of claim 15 wherein said nutrients include compounds selected from the group consisting of vitamins, minerals, natural nutrients, and mixtures thereof.

25. The product of claim 24 wherein said vitamins are selected from the group consisting of derivatives of vitamin A, beta-carotene, thiamin, riboflavin, niacin, vitamin B₆, vitamin B₁₂, vitamin C, vitamin D, vitamin E, folic acid, and mixtures thereof.

26. The product of claim 24 wherein said minerals are selected from the group consisting of derivatives of calcium, copper, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, zinc, and mixtures thereof.

27. The product of claim 24 wherein said natural nutrients are selected from the group consisting of Echinacea extract, ginkgo biloba extract, ginseng, bee pollen, St. John's wort extract, and mixtures thereof.

28. The product of claim 15 wherein said sweeteners are selected from the group consisting of sugar, fructose, honey, corn syrup, molasses, fruit juice, artificial sweeteners, and mixtures thereof.

29. The product of claim 15 packaged in a bulk quantity.

30. The agglomerated oat flake product of claim 20 wherein said coating is applied in a substantially uniform manner to the surface of the oat flakes.

31. A method of coating uncooked oat flakes with a desired coating material comprising:

feeding uncooked oat flakes into a rotating drum;

coating the oat flakes by spraying the oat flakes with a stream of said fat-free coating material until said coating material is applied to the oat flakes in a substantially uniform manner; and

drying the coated oat flakes until the oat flakes attain a desired percentage of moisture.

32. The method of claim 31 wherein said coating material is prepared by

mixing at least one component selected from the group consisting of colorants, flavors, nutrients, and sweeteners with water to form a coating mixture; and

heating the coating mixture to about 100-160° F. to dissolve the components of said coating mixture and form said coating material.

33. The method of claim 31 wherein said coating material is applied to said uncooked oat flakes at a concentration of from about 0.1% to about 60% by weight of the coated oat flakes.

34. The method of claim 31 wherein said coating material is applied to said uncooked oat flakes at a concentration of from about 15% to about 50% by weight of the coated oat flakes.

35. The method of claim 31 wherein said coated oat flakes are dried at a temperature in the range of from about 100° F. to about 500° F.

36. The method of claim 31 wherein said coated oat flakes are dried on a continuous belt dryer.

37. The method of claim 31 wherein said drying step is achieved on a fluidized bed, forced air dryer.

38. The method of claim 31 wherein said coating and drying steps occur simultaneously.

39. The method of claim 31 wherein said coated oat flakes are dried to about 3-14% moisture on a dry weight basis.

40. A method of forming coated, uncooked oat flake agglomerates that have no added fat comprising

feeding uncooked oat flakes into a rotating drum,

coating the oat flakes by spraying said oat flakes with a stream of a coating material comprising a binding material until said oat flakes form oat flake agglomerates, each said oat flake agglomerate comprising at least two oat flakes, and

drying said oat flake agglomerates to a desired percentage of moisture.

41. The method of claim 40 wherein the binding material is selected from the group consisting of sugar, fructose, honey, corn syrup, molasses, fruit juice, hydrocolloids, maltodextrin, and corn syrup solids and mixtures thereof.

42. The method of claim 40 wherein said coating material is prepared by

mixing at least one component selected from the group consisting of colorants, flavors, nutrients, and sweeteners to form a coating mixture, and

heating the coating mixture to an elevated temperature to dissolve or disperse the components of said coating mixture and form said coating material.

43. The method of claim 40 wherein said coating material is applied to said uncooked oat flakes to form oat flake agglomerates having a coating concentration of from about 20% to more than 60% by weight of the coated oat flake agglomerate.

44. The method of claim 40 wherein said coated oat flake agglomerates are dried at a temperature in the range of from about 100° F. to about 500° F.

45. The method of claim 40 wherein said coated oat flake agglomerates are dried on a continuous belt dryer.

46. The method of claim 40 wherein said drying step is achieved on a fluidized bed, forced air dryer.

47. A flavored oat product in bulk having flavors uniformly distributed throughout the bulk and comprising uncooked, coated flaked oats, the coating being fat-free and adhered to the surface of the flaked oats, the coating comprising at least one flavoring component and at least one material selected from the group consisting of colorants, nutrients, and sweeteners.

48 The product of claim 47 wherein said coating material comprises from about 0.1% to about 60% by weight, on a dry weight basis of the flavored oat product.

49 The product of claim 47 wherein said coating material comprises from about 20% to about 50% by weight, on a dry weight basis of the flavored oat product.

50 The product of claim 47 wherein said coating material comprises from about 35% to about 45% by weight, on a dry weight basis of the flavored oat product.

51 The product of claim 47 comprising a mixture of a plurality of coated oat flakes of a first color present in the coating of said oat flakes and a plurality of other coated oat flakes of a second color, distinct from the first color, said second color being present in the coating of said other oat flakes, said colors provided by water-soluble colorants and when said product is placed in an aqueous liquid, a new color is formed in said liquid from a combination of said first and second colors.

52 The product of claim 51 wherein the first color is yellow and the second color is blue.

53 The product of claim 51 wherein the first color is red and the second color is yellow.

54 The product of claim 51 wherein the first color is red and the second color is blue.

55 The product of claim 47 wherein said nutrients include compounds selected from the group consisting of vitamins, minerals, natural nutrients, and mixtures thereof.

56 The product of claim 55 wherein said vitamins are selected from the group consisting of derivatives of vitamin A, beta-carotene, thiamin, riboflavin, niacin, vitamin B₆, vitamin B₁₂, vitamin C, vitamin D, vitamin E, folic acid, and mixtures thereof.

57 The product of claim 55 wherein said minerals are selected from the group consisting of derivatives of calcium, copper, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, zinc, and mixtures thereof.

58 The product of claim 55 wherein said natural nutrients are selected from the group consisting of Echinacea extract, ginkgo biloba extract, ginseng, bee pollen, St. John's wort extract, and mixtures thereof.

59 The product of claim 47 wherein said sweeteners are selected from the group consisting of sugar, fructose, honey, corn syrup, molasses, fruit juice, artificial sweeteners, and mixtures thereof.

60 A flavored oat product in bulk comprising agglomerated, coated, flaked oats composed of at least two uncooked oat flakes having a fat-free coating, said coating comprising at least one material selected from the group consisting of colorants, flavors, nutrients, and sweeteners.

61 The product of claim 60 wherein said at least one material is uniformly distributed throughout the product in bulk.

62 The product of claim 60 wherein said coating comprises from about 20% to about 60% by weight, on a dry weight basis of the flavored agglomerated oat product.

63 The product of claim 60 wherein said coating comprises from about 35% to about 45% by weight, on a dry weight basis of the flavored agglomerated oat product.

64 The product of claim 60 wherein said agglomerate comprises from two to ten flakes.

65 The product of claim 60 wherein said agglomerate comprises more than ten oat flakes.

66 The product of claim 60 wherein said agglomerate comprises from 20 oat flakes to more than 40 oat flakes.

67 The product of claim 60 comprising a mixture of a plurality of coated oat flakes of a first color present in the coating of said oat flakes and a plurality of other coated oat flakes of a second color, distinct from the first color, said second color being present in the coating of said other oat flakes, said colors provided by water-soluble colorants and when said product is placed in an aqueous liquid, a new color is formed in said liquid from a combination of said first and second colors.

68 The product of claim 60 wherein the first color is yellow and the second color is blue.

69 The product of claim 60 wherein the first color is red and the second color is yellow.

70 The product of claim 60 wherein the first color is red and the second color is blue.

71 The product of claim 60 wherein said nutrients include compounds selected from the group consisting of vitamins, minerals, natural nutrients, and mixtures thereof.

72 The product of claim 71 wherein said vitamins are selected from the group consisting of derivatives of vitamin A, beta-carotene, thiamin, riboflavin, niacin, vitamin B₆, vitamin B₁₂, vitamin C, vitamin D, vitamin E, folic acid, and mixtures thereof.

73 The product of claim 71 wherein said minerals are selected from the group consisting of derivatives of calcium, copper, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, zinc, and mixtures thereof.

74 The product of claim 71 wherein said natural nutrients are selected from the group consisting of Echinacea extract, ginkgo biloba extract, ginseng, bee pollen, St. John's wort extract, and mixtures thereof.

75 The product of claim 60 wherein said sweeteners are selected from the group consisting of sugar, fructose, honey, corn syrup, molasses, fruit juice, artificial sweeteners, and mixtures thereof.

76 The product of claim 60 wherein said coating is applied in a substantially uniform manner to the surface of the oat flakes.

77 A corn grit product comprising individual pieces of unflaked corn grit coated with a fat-free coating comprising at least one material selected from the group consisting of colorants, flavors, nutrients, and sweeteners.

78 The product of claim 77 wherein said coating comprises from about 5% to about 40% by weight, on a dry weight basis of the coated corn grit.

79 The product of claim 77 comprising a mixture of a plurality of coated corn grits of a first color present in the coating of said corn grits and a plurality of other coated corn grits of a second color, distinct from the first color, said second color being present in the coating of said other corn grits, said colors provided by water-soluble colorants and when said product is placed in an aqueous liquid, a new color is formed in said liquid from a combination of said first and second colors.

80 The product of claim 77 wherein said nutrients include compounds selected from the group consisting of vitamins, minerals, natural nutrients, and mixtures thereof.

81 The product of claim 80 wherein said vitamins are selected from the group consisting of derivatives of vitamin A, beta-carotene, thiamin, riboflavin, niacin, vitamin B₆, vitamin B₁₂, vitamin C, vitamin D, vitamin E, folic acid, and mixtures thereof.

82 The product of claim 80 wherein said minerals are selected from the group consisting of derivatives of calcium,

copper, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, zinc, and mixtures thereof.

83 The product of claim 80 wherein said natural nutrients are selected from the group consisting of Echinacea extract, ginkgo biloba extract, ginseng, bee pollen, St. John's wort extract, and mixtures thereof.

84 The product of claim 77 wherein said sweeteners are selected from the group consisting of sugar, fructose, honey, corn syrup, molasses, fruit juice, artificial sweeteners, and mixtures thereof.

85 A corn grit product comprising clusters of corn grit pieces having a fat-free coating, wherein said coating comprises at least one material selected from the group consisting of colorants, flavors, nutrients, and sweeteners.

86 The product of claim 85 wherein said coating comprises from about 5% to about 40% by weight, on a dry weight basis of the corn grit cluster.

87 The product of claim 85 wherein said coated cluster comprises at least 2 pieces of corn grit.

88 The product of claim 85 comprising a mixture of a plurality of coated corn grit clusters of a first color present in the coating of said corn grit clusters and a plurality of other coated corn grit clusters of a second color, distinct from the first color, said second color being present in the coating of said other corn grit clusters, said colors provided

by water-soluble colorants and when said product is placed in an aqueous liquid, a new color is formed in said liquid from a combination of said first and second colors.

89 The product of claim 85 wherein said nutrients include compounds selected from the group consisting of vitamins, minerals, natural nutrients, and mixtures thereof.

90 The product of claim 89 wherein said vitamins are selected from the group consisting of derivatives of vitamin A, beta-carotene, thiamin, riboflavin, niacin, vitamin B₆, vitamin B₁₂, vitamin C, vitamin D, vitamin E, folic acid, and mixtures thereof.

91 The product of claim 89 wherein said minerals are selected from the group consisting of derivatives of calcium, copper, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, zinc, and mixtures thereof.

92 The product of claim 89 wherein said natural nutrients are selected from the group consisting of Echinacea extract, ginkgo biloba extract, ginseng, bee pollen, St. John's wort extract, and mixtures thereof.

93 The product of claim 85 wherein said sweeteners are selected from the group consisting of sugar, fructose, honey, corn syrup, molasses, fruit juice, artificial sweeteners, and mixtures thereof.

* * * * *

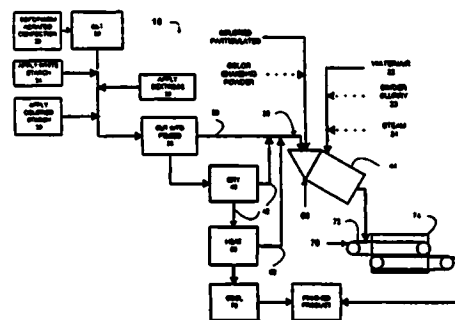
PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : A23G 3/00, 3/28, 3/20, 3/26		(11) International Publication Number: WO 00/64271
A1		(43) International Publication Date: 2 November 2000 (02.11.00)
(21) International Application Number: PCT/US00/10749		(74) Agents: O'TOOLE, John, A. et al., General Mills, Inc., Number One General Mills Boulevard, P.O. Box 1113, Minneapolis, MN 55440 (US).
(22) International Filing Date: 19 April 2000 (19.04.00)		
(30) Priority Data: 09/298,715 23 April 1999 (23.04.99) US		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TO).
(71) Applicant (for all designated States except US): GENERAL MILLS, INC. [US/US], Number One General Mills Boulevard, P.O. Box 1113, Minneapolis, MN 55440 (US).		
(72) Inventors; and (75) Inventors/Applicants (for US only): ZIETLOW, Philip, K. [US/US], 875 County Road 24, Wayzata, MN 55391 (US); FRANSSELL, Dean [US/US], 8275 County Road 116, Hamel, MN 55340 (US); GANESAN, S., Ganesh [US/US], 11220 Red Fox Drive, Maple Grove, MN 55369 (US); LANGENFELD, Mathew, F. [US/US], 3865 144 Street West, Rosemount, MN 55068 (US); PALKERT, Philip, E. [US/US], 18218 Tristram Way, Eden Prairie, MN 55346 (US); STINSON, James, L. [US/US], 2623 Casco Point Road, Wayzata, MN 55391 (US); VAN LINGERICH, Bernhard [DE/US], 18005 33rd Place North, Plymouth, MN 55447 (US).		
Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments		

(54) Title: APPEARANCE MODIFIED AERATED CONFECTION AND METHOD OF PREPARATION



(57) Abstract

Disclosed are aerated confections in the form of pieces having a body color and a body exterior surface importantly characterized by at least a portion of which has been modified to provide and appearance disparate to the body. The aerated food products comprise 50 to 98 % of a saccharide component, about 0.5 to 30 % of a structuring agent, and about 1 to 8 % moisture. The aerated food products have a density of about 0.1 to 1.0 g/cc. The products are additionally characterized by having an external surface, and wherein at least a portion of the external surface has distinguishing feature differing from the body in color, texture or structure. Preparation methods are disclosed comprising providing a mass of aerated confection pieces having at least one colored portion and having an external surface at least a portion of which is sticky, applying particles of a coating at least a fraction of which have a second color to adhere the particles to the sticky portion of the surface, and, forming the coated aerated confection pieces into finished non-sticky coated pieces. The confectionery food products find particular suitability for use as ingredients for children's RTE cereals.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	BS	Bosnia	LS	Lesotho	SI	Slovenia
AM	Armenia	BT	Botswana	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	CH	China	MG	Madagascar	TJ	Tajikistan
BE	Belgium	CN	China	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	CR	Costa Rica	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Cote d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

1

APPEARANCE MODIFIED AERATED CONFECTION
AND METHOD OF PREPARATION

Field of the Invention

5 The present invention is directed generally to food products and to their methods of preparation. In particular, the present invention is directed to improved aerated confectionery products such as dried marshmallows having a modified surface and to processes for making such surface
10 modified aerated, confectionery products.

Background

Aerated confections products are popular food items. Some products are fabricated from aerated confections compositions that comprise a fat constituent while others are
15 substantially free of such fat constituents. An illustrative fat free aerated confection is the common marshmallow. Such marshmallow products are familiar in both larger and smaller sizes.

It is well known that such marshmallows when fresh are
20 soft and pliable but will stale by losing moisture and become hard. Indeed, purposefully pre-dried aerated confections are also well known. These products, particularly in smaller or bit sizes, are commonly added to certain popular Ready-To-Eat ("RTE") breakfast cereals, particularly those marketed to
25 children. Due to their small size (i.e., having a number count of 4 to 6/g), these dried aerated confectionery marshmallow products are sometimes colloquially referred to as

2

"Mar." bits or "marbits". The marbits must be pre-dried prior to admixture with the RTE cereal in order to reduce unwanted moisture migration from the marbit to the cereal and thus to forestall the multiple problems resulting therefrom.

5 While there are many types of marshmallow products on the market, their methods of preparation generally fall into two main process groups: extruded marshmallow and deposited marshmallow. In both types, a sugar syrup and a structuring agent (such as an albumin, agar or, preferably a gelatin) are
10 the two main ingredients. Typically, the sugar syrup is heated to reduce moisture and is thereafter cooled down, and then combined with the gelatin solution to form a slurry. That slurry is then aerated to form a foam, and after aeration, colors and flavors are then added to the foam. The particular marshmallow product may be formed into its final
15 shape by an extrusion process. That is, after aeration, the foam is extruded through a die to form a rope. The dye imparts the desired peripheral shape to the extrudate rope. The rope is allowed to rest briefly to set, and then is cut
20 into desired sizes. For dried marshmallows, the process can additionally include one or more drying steps. (See, for example US 4,785,551 issued 2 Nov 1988 to W. J. Meyer entitled "Method of Drying Confection Pieces").

While marshmallows of a single color are most common,
25 marshmallows having two or even a plurality of colors (collectively herein, "multi-colored") are also known (see, for example, D 376,039 issued Dec. 3, 1996 entitled "Food Product" showing a two color marbit design) as well as methods for their preparation. (See, for example, US 4,925,380 issued
30 10/20/1986 entitled "Multicolor Confection Extrusion System and 5,019,404 issued 2/28/1990 entitled "Multicolor Confection Extrusion System", each of which are incorporated herein by reference). Both the '404 and '380 well describe the difficulties and sensitivities of such foam product

preparation. The conventional processes for making multi-colored marshmallows teach to divide the aerated foam into a plurality of sub-streams, to admix a desired colorant to each sub-stream, and then extrude these colored sub-streams in substantially equal portions into a single rope or multiplicity of such ropes.

While multicolored marshmallow pieces have enhanced consumer appeal particularly for children's products, there is a continuing need for new confection products having novel appearance and appeal.

The present invention provides improvements to aerated confections especially dried marshmallow pieces. More particularly, the present invention relates to dried marshmallow pieces having surface modifications to alter their appearance and to methods of preparing such appearance modified aerated confection pieces.

In certain preferred embodiments, the provision of a surface modified appearance involves applying a topical particulate coating. Since fresh or undried aerated confections are naturally sticky, a topical starch coating is conventionally applied to eliminate the sticky surface attribute. Excess starch is removed such as by vibration. While effective, residual starch renders the aerated confections' surface so resistant to adhesion that providing a coating, especially a discontinuous particulate coating, that resists separation is difficult. Adhering particulate coating is even more challenging for dried aerated confection since drying further reduces surface stickiness. The present invention provides methods for preparing coated dried aerated confections that overcome the problems of resistance to adhesion.

Summary of the Invention

In its product aspect, the present invention resides in aerated confections in the form of pieces having a body color

and a body exterior surface importantly characterized by at least a portion of which has been modified to provide an appearance disparate to the body.

The aerated confections comprise a body fabricated from an aerated confection comprising:

- about 50 to 95% of a saccharide component;
- about 1 to 30% moisture;
- about 0.5 to 30% of a structuring agent; and,

The confection compositions have densities of 0.10 to 1.0g/cc.

The products are additionally characterized by a size of 0.1 to 5/g. These products can have a body of one color or the body can comprise a plurality of disparately colored phases. The products further can comprise a surface including a coating in a weight ratio of coating to body ranging from about 0.1:100 to about 30:100.

In its principal method aspect, the present invention provides methods for preparing an aerated confection, comprising the steps of:

- A. Topically applying a substance to adhere to aerated confection pieces having at least one portion having a first color and having a moisture content of about 1% to 30% to provide sticky aerated confection pieces having an substance adhered thereto; and
- B. Processing the sticky aerated confection pieces having an substance adhered thereto to form non-sticky aerated confection pieces with substances adhered having a moisture content of about 1% to 8%.

Description of the Drawings

Figure 1 is a schematic process flow diagram of one preferred embodiment of the present method of preparation.

Detailed Description of the Invention

The present invention provides appearance modified aerated confections products and to methods for preparing such

5

aerated confections products. Each of the product ingredients and product features and steps of the present methods are described in detail below.

Throughout the specification and claims, percentages are
5 by weight and temperatures in degrees Fahrenheit unless otherwise indicated.

Broadly, the present invention relates to dried aerated confections pieces having substances adhered to their exterior surfaces to modify their external appearance and to methods
10 for preparing such dried aerated confectionery pieces. Generally, their methods of preparation involve adhering substances to the exterior of the aerated confectionery pieces to form sticky pieces with substances adhering to at least a portion of their exterior and processing the sticky pieces to
15 form non-sticky pieces.

The adhering substance can either be a liquid or be in particle form or be a mixture. For example, a mixture could involve an edible ink wherein a liquid carrier serves to suspend an edible ink colorant or pigment.

20 More specifically, either the aerated confection pieces can be themselves be sticky, or the substances that are adhered thereto can themselves be sticky or both the pieces and the adhering substance can each be sticky.

In preferred embodiments, the aerated confection pieces
25 are sticky or are made sticky. In this preferred embodiment, the methods herein essentially include a first step of providing a quantity or supply of solid aerated confection pieces. By "aerated confection product" is meant an aerated solid confectionery food product in solid form having a
30 density in the range of from about 0.10 to about 1.0g/cc and comprising saccharides, a foam structuring agent, and moisture. By "solid" is meant that a warm aerated confectionery foam has been allowed to at least partially set

6

such as by cooling to below the set temperature of its foam structuring component.

The aerated confectionery compositions products are fabricated from compositions that essentially comprise about
5 50 to about 95% of a saccharide component as the principle ingredient. Preferably, the saccharide component is used at about 70 to 90% of the confectionery compositions.

The saccharide component can include pure monosaccharide dextrose (e.g., anhydrous, monohydrate or dextrose syrup) and
10 disaccharide sugars such as sucrose, and fructose, as well as hydrolyzed starch syrups such as corn syrup which include dextrin, maltose and dextrose, invert sugar syrups which include levulose and dextrose and/or converted fructose or glucose syrups. A portion of the saccharide component may be
15 supplied by impure or flavored saccharidic ingredients such as fruit juices, purees, honey nectars, concentrated fruit juices, fruit flavors and mixtures thereof. The saccharide component can also include polysaccharides such as cornstarch.

The confection essentially further includes about 0.5 to
20 30%, preferably about 1 to 4%, and most preferably about 2.5 weight percent of a foam structuring or gelling component. Suitable structuring components include hydrocolloid colloids such as pectin, gelatin, modified starches, gums (e.g., guar) and mixtures thereof. For products to be marketed in North
25 America, the preferred structuring agent is gelatin. The gelatin can be derived from bovine, porcine, or piscine (fish) sources or can be of mixtures thereof. Preferred for use herein for cost and purity is bovine gelatin.

The present aerated confectionery compositions can range
30 in moisture content about 1 to 30%. In one variation, the aerated confections can be in the form of a soft marshmallow defined in part by a moisture content of about 10 to 30%, preferably 12 to 18%. In another preferred variation, the marshmallows are dried to form dried frangible compositions

having a moisture content ranging from about 1-6%, preferably about 2-5%.

The food product compositions can further comprise a wide variety of supplemental materials to improve the organoleptic, visual, or nutritional properties of the finished confectionery products. Useful materials include, for example, colors, flavors, high potency sweeteners, preservatives, nutritional fortifying ingredients and mixtures thereof. If present, such optional materials can collectively comprise from about 0.01% to about 25% by weight of the present products, preferably about 1 to 10%.

More preferably, any insoluble component such as mineral fortifying ingredient (e.g., calcium carbonate for calcium fortification) is added in the form of a fine powder having a particle size such that 90% has a particle size of less than 150 micron, preferably 100 μ m or less in size.

In highly preferred embodiments, the present products comprise a calcium ingredient of defined particle size in an amount effective to provide the desired calcium enrichment. Good results are obtained when the present aerated confectionery compositions comprise sufficient amounts of calcium ingredients to provide the total calcium content of the composition to from about 50 to 2500 mg per 28.4g (1 oz) serving (dry basis) (i.e., about 0.15 to 10% by weight, dry basis) of calcium, preferably about 100 to 1500 mg Ca per 28.4 g (1 oz.), and more preferably about 200 to 1500 mg Calcium/oz.

Useful herein to supply the desired calcium levels are calcium ingredients that supply at least 20% calcium. Preferred for use herein are calcium ingredients selected from the group consisting of food grade calcium carbonate, ground limestone, calcium phosphate salts and mixtures thereof.

In one preferred embodiment, the marshmallows are fat free, i.e., have fat contents of less than 0.5% (dry weight basis). Low fat products are preferred for use herein since such products are more easily able to be formulated to form the present quickly dissolving products. In these embodiments, the fat level is provided by lipid content associated with one or more ingredients as compared to addition of a fat component. In other variations, e.g., chocolates, the aerated confection can comprise about 1 to 25% of an added fat component homogeneously blended with the other components preferably about 1 to 10% such as cocoa butter, dairy fat or dairy fat containing (e.g., cheese) or other edible fatty triglyceride or fat mimics such as sucrose polyesters.

The compositions can be optionally flavored and/or colored to provide uniform products or products having phases of variously colored and flavored portions. By "color" is meant a confection of any color, including white, which may be provided by the base confection ingredients, and by additional artificial or natural coloring agents. "Color" also includes various hues or shades, e.g., pink and red.

In preferred embodiments, the aerated confections can comprise about 1 to 15% cornstarch as part of their saccharide component resulting from the starch application step practiced as described below.

The confections' compositions have densities of 0.10 to 1.0g/cc, preferably about 0.1 to 0.4 g/cc and most preferably about 0.15 to 0.30g/cc. Preferred products have a density of about 0.1 to 0.4 g/cc at moisture contents of 1 to 6%, preferably 2 to 5%.

In preferred embodiments, the pieces have a size count ranging from about 0.2 to 6/g, preferably about 1 to 6 pieces per gram, and most preferably about 4 to 6 pieces per gram. Thus, individual pieces can range in size from about 0.1 to 5g

each. As a result, these pieces generally have a bulk density of about 235 to 340g per liter.

The present appearance modified products herein are essentially characterized by an exterior surface importantly characterized by at least a portion of which has been modified to provide an appearance disparate to the body.

In one variation, the surface can be smooth and shiny or glossy in comparison with the flat or matted appearance of the body. The smooth shiny surface is obtained, for example, by heating as described in detail below to fuse the discontinuous cellular structure of the foam to form a skin feature in the form of a continuous thin (less than 0.1 mm) film. The shiny appearance can be applied to a portion of the exterior surface, e.g., to one or both of opposed major surfaces of a planar shaped piece, or to substantially the entire surface, e.g., including the periphery of the planar piece. This thin film is to be distinguished from a conventional candy coating obtained by common panning techniques in that the coating can be formed of and thus compositionally equivalent to the body of the pieces. In minor variations, however, the film or glossy appearance results from fusing a particulate dextrose particulate coating.

In another variation, the products appearance modified surface can be accomplished using a coating that changes the surface appearance relative to the appearance of the body of the pieces.

The coating for example can include particles of a single different color or include a multiplicity of disparately colored particles, especially carbohydrate based particles.

The particles can be water soluble. Soluble coatings can include, for example, colored sucrose crystals. For example, colored sugar particles or "sanding sugars" as they are known in the baking art are commercially available and are particularly suitable for use herein due to their low cost.

In this variation, the particles can be of one color and completely obscure the second color of the underlying body. Also, sanding sugars of various colors can be mixed to form a multicolored aggregate and applied to a surface of the pieces.

In one variation, the coatings can include an insoluble particulate coating material such as corn starch that has been dyed to a color other than white, e.g., primary colors of red, blue, or yellow. In other variations, the particles can be supplied by hydrophilic colloids that have been colored.

Preferred for use is agar that has been colored to form colored agar particles. The colored agar particles are in flake form and can range in size from about 1 to 200 micron in size.

In another variation a mixture of insoluble and soluble colorants are admixed into the coating each having a separate color. The insoluble colorants impart a first color, e.g., blue, to the coated confection that is visible when the pieces are dry. Upon addition to milk such as when added to an RTE cereal, the soluble dyes in the coating (e.g., red) can dissolve expressing that color in the coating. Such coated pieces find usefulness as novel "color changing" confections that "magically" change color in milk. In such variations, it has been found that the ratio of insoluble colorants or pigments to soluble colorants or dyes can range from about 1:5 to about 20:1.

In other variations, the particles can comprise water soluble dyes and/or water insoluble colorants such as lake dyes per se in particulate form. If desired, the colorants and particulates can be mixed to form an aggregate particulate coating comprising both colorants and other particles.

In still other variations, the surface coating particles can include flavors. For example, powdered cinnamon can be admixed with powdered sugar in a weight ratio of about 2:1 to about 1:4.

In still other variations, the particulate coating can comprise dried fruit bits, nuts, cookie crumbs, and mixtures thereof.

The coated pieces can be formed having a coatings to base
5 weight ratio of about 0.1:100 to about 30:100, preferably about 3:100 to 10:100.

The coatings are formed of particles having a widely varying particle size ranging from about 0.5 to 2,000 microns, preferably about 1 to 500 microns.

10 In still another variation, the coating can be formed into a pattern. For example, colored particulates can be applied as a graphic or text pattern. The pattern can be applied using printing (e.g., printing with edible inks or offset printing) or other image transfer techniques. In these
15 variations, the amount of coating material to pieces is very small and on the order of 1:1,000. In still other variations, the techniques can be combined, for example, the confection pieces can be provided with a shiny surface including an overlaying image.

20 In still other variations, all or a portion of the optional materials that can be included into the aerated confection foam compositions from which the body of the pieces are fabricated can be admixed into the particulate topical coating.

25 The surface appearance modified confection pieces 80 are useful as confections having novel visual appeal.

Additionally, the appearance modified confectionery pieces find particular suitability for use as an appealing added component of food products to provide novelty or play
30 value.. For example, the pieces may be added to RTE breakfast cereal, especially sugar coated RTE cereals intended as children's breakfast cereals. In other variations, the confections can be added to dry mixes for hot chocolate or as pieces in grain based snack bars.

In a preferred embodiment, the finished RTE cereal can comprise about 65 to 99% of a conventional dried cereal (such as flakes, shreds, puffs, biscuits formed from a cooked cereal grain or dough of oats, wheat, corn, barley, rice or mixtures)
5 and about 1% to about 35% by weight of the present novel appearance modified confectionery pieces, preferably about 20 to 30%. In more preferred embodiments, the RTE cereal pieces include a presweetener coating.

In still other variations, the present confections can be
10 admixed with instant oatmeal, dry cocoa beverage mix (especially smaller sized pieces), and dry mixes for other products, e.g., gelatin dessert. The confections can also be used in cereal bar products, toppings for desserts such as ice cream or yogurt, or on various baked goods.

15 In other variations, the confections provide appealing carriers for various ethical drugs, vitamins, minerals and the like. Due to the aerated and frangible texture, the confections are easy to chew and are quickly dissolving.

Method of Preparation

20 The invention further provides processes for making the above-described appearance modified aerated confection and products. Referring now to the drawing, Figure 1 shows a schematic flow diagram of a preferred embodiment in several variations of the present methods referred to generally by
25 reference numeral 10. As illustrated, the present methods 10 include an essential initial first step 20 of providing a mass of aerated confection pieces or base pieces having at least one colored portion and having an external surface at least a portion of which is sticky. By "sticky" is meant that some
30 particulates will adhere to the sticky surface.

In one variation, step 20 can involve supplying moist pieces 26 that are naturally sticky. In this variation, a fresh (i.e., undried) aerated foam 30 can be provided such as from an extruder in the form of a warm pliable or plastic unset foam having a moisture

content of about 15 to 30%. By "plastic" is meant that the temperature of the foam is above the set point temperature of the foam structuring agent and is thus easily deformable. The confection 30 can be characterized by a pattern including a peripheral shape such as a circle, star, animal figure or other shape including both regular and irregular shapes. The pattern can further include colorations including various internal portions or filaments. The confection is allowed to set 32 to form a set foam such as by cooling. The set foam can then have starch such as white cornstarch 34 applied to the surface to reduce stickiness or dextrose 35 if a shiny surface appearance is desired. In still another variation, a colored starch 38 or blend of starches of various colors can be used. Excess starch can then be removed. The set foam can then be formed into pieces such as by a cutting step 36 thereby exposing the sticky interior to form undried set foam wafer pieces 26 having at least one sticky surface or at least a portion of the surface being sticky. The fresh pieces 26 can be fed directly into enrober 44. If desired, a small quantity of added moisture, e.g., 1 to 3% can be used to further adjust the desired stickiness of the pieces.

In other variations, the foam can be deposited into means for forming shaped pieces such as conventional starch molds and allowed to set. This technique is particularly suitable for forming pieces having a three dimensional shape rather than simply having a shaped periphery or two dimensional pieces such as wafers.

In another variation, pieces 26 can be dried in drying step 40 to form dried confections 42 not having a sticky surface and step 20 can involve applying sufficient amounts of moisture or other fixative to the surface of the confection pieces to provide the sticky surface. For example, dried confection pieces 42 having a moisture content of about 2% to less than 15% generally have a nonsticky exterior surface even without starching. Dried

confections pieces 42 can be supplied to an enrober 44 and tumbled with the added moisture to render their surface sticky.

The moisture can be provided, for example, in the form of fine jet or spray of water 22 (e.g., co-sprayed or atomized with air to form a fine droplet size aerosol with air at a pressure of 40 to 60 psig), steam 24 or associated with an edible binder solution 23 to the dried pieces.

The amount of moisture is small such as on the order of 0.1 to 7% preferably about 3 to 7%. For example, an edible binder solution comprising about 20 to 40% edible binders in water. Suitable binders can include film forming carboxymethyl cellulose, starches, edible glue, maltodextrins and mixtures thereof. When the coating particles, however are soluble carbohydrates especially applying lower levels of coating particulates, smaller quantities of added moisture are employed such as 0.1% added moisture. Care should be expressed to avoid excessive moisture addition which can undesirably result in the pieces adhering to each other.

In a minor variation, a small quantity (1 to 3%) of edible oil can be used as a fixative for the particulate coating.

In another variation, the starting material comprises heated dried confection pieces 52 still hot after having been dried to a moisture content of 1 to 5%, preferably about 2 to 3.5%, and more preferably about 2 to 3%. The hot, dried confections are characterized by having a starting temperature or at least a surface temperature above their glass transition temperature. Good results are generally obtained when the pieces temperature or at least the piece surface temperature is within the range of 180 to 240°F (82.2 to 115.5°C), preferably 200 to 230°F (93.3 to 110°C). In this variation, no added moisture is employed. This variation finds particular suitability for use when the coating particles comprise colored insoluble carbohydrates. In less preferred variations, the dried confections have previously been allowed to cool such as to room temperature and are reheated to a

15

temperature within the starting temperature range to provide heated dried pieces 52.

In still another variation, dried pieces 42 can be heated in heating step 50 such as with infrared heating to form dried heated pieces 52 having a surface that is sticky rather than the entire piece body.

The present methods further can include a step of applying particles 60 of a coating at least a fraction of which have a second color to adhere the particles to the sticky portion of the surface of the confection pieces. A prescribed amount of confection pieces and a prescribed amount of coating particles are introduced into a container so that they can be intimately mixed together. Conveniently, the applying step can be practiced in enrober 44 that tumbles the confection pieces during the particulate application step.

Thereafter, the present methods essentially comprise the step of processing 70 the coated aerated confection pieces into finished non-sticky coated pieces.

In one variation, this processing step 70 can comprise drying the coated pieces to moisture contents at which they are no longer sticky. Various drying procedures and techniques can be satisfactorily employed. A suitable finished product 80 can be obtained by drying at room temperature for a prescribed period of time. Processing step 70 can include accelerated heat drying. The surface appearance modified pieces having a particulate coating confection pieces can be charged to an endless belt 72 which convey the aerated confection pieces to one or more heated zones or tunnel 74 that is maintained at a temperature within the desired drying range to dry to a final moisture content of about 1 to 5%. The speed and length of the endless belt are controlled so as to provide a residence time within the heated zone(s) for a time within the 1 to 15 minute time range. The drying can be practiced to remove only the added moisture. In other

16

variations, the drying can be practiced to also remove moisture associated with employed fresh high moisture base pieces rather than dried base pieces.

In another variation, processing step 70 can involve cooling in step 76 the coated pieces that have been heated in heating step 50 such as with infrared heating can be to ambient temperature to provide the desired finished non-sticky products 80 herein.

By adjustment of the type and quantity of coating, finished products can be prepared of sizes and densities within the above described ranges for the aerated confection body per se. Thus, the present improved finished aerated confectionery pieces 80 can be characterized by a density of 0.1 to 1g/cc, preferably about 0.1 to 0.4g/cc, and most preferably 0.15 to 0.3g/cc. In preferred embodiments, the pieces have a size count ranging from about 0.2 to 6/g, preferably about 1 to 6/g, and most preferably about 4 to 6/g.

The finished aerated confectionery pieces can then be consumed as confections.

20

Example 1

An appearance modified aerated food product of the present invention is prepared having a base fabricated from a composition having the following formulation:

<u>Ingredient</u>	<u>Weight %</u>
Sucrose	60.13
Powdered Sugar	16.80
Dextrose	9.46
Corn syrup (42 DE)	8.70
Gelatin	1.75
Color	0.13
Flavor	0.15
Moisture	2.88

17

The shaped pieces are prepared from this composition in the form of having about 4 to 6 pieces per gram. The base pieces have two portions of a different color.

The base pieces are provided with a topical coating comprising colored sucrose particles of a third color in a weight ratio of sucrose particles to base of about 15:100 to completely cover the exterior surface of the base.

The coating is applied by feeding base pieces having a moisture content of about 5% to an enrober with a small quantity of water to moisten and make sticky their surface. The wetted base pieces are tumbled with the sucrose coating particles to coat the pieces by adhering to the sticky surface.

The coated pieces are air dried for about 60 minutes at 150°C to dry to a moisture content of about 4.5% to form the finished pieces.

The finished pieces are admixed with puffed oat based cereal pieces in a ratio of about 30:100 to form a children's RTE cereal.

Upon addition of cold milk to a bowl of the RTE cereal, the colored sucrose coating quickly dissolves to reveal the base having a different coating to provide "color changing" aerated pieces.

18

WHAT IS CLAIMED IS:

1. A process for preparing topically coated dried aerated confection pieces, comprising the steps of:
 - A. Topically applying a substance to adhere to aerated confection pieces having at least one portion having a first color and having a moisture content of about 1% to 30% to provide sticky aerated confection pieces having an substance adhered thereto;
 - B. Processing the sticky aerated confection pieces having an substance adhered thereto to form non-sticky aerated confection pieces with substances adhered having a moisture content of about 1% to 8%.
2. The method of claim 1 wherein in step A the aerated confection pieces include an external sticky surface.
3. The method of claim 1 wherein the substance is sticky.
4. The method of claim 2 wherein step A includes the substep of: applying moisture to the surface of dried non-sticky aerated confection pieces having a moisture content of about 1% to 10% to form aerated confection pieces including an external sticky surface.
5. The method of claim 4 wherein at least a portion of the added moisture is provided by water.
6. The method of claim 1 wherein at least a portion of the substance are in the form of particles having a particle size of about 1 to 2,000 microns.
7. The method of claim 6 wherein at least a portion of the particles of the coating are water soluble.
8. The method of claim 1 wherein the substance comprises a mixture of water soluble and water insoluble particles.
9. The method of claim 8 wherein at least a portion of the water insoluble particles are of a different color than at least a portion of the water soluble particles.
10. The process of claim 2 wherein step A includes the sub-steps of:

25

19

- providing aerated confection pieces having a moisture content of about 1 to 5%;
applying sufficient amounts of moisture to the surface of the pieces to develop a sticky surface.
5 applying particles to particles to the sticky surface to form sticky aerated confection pieces having a substance in particle form adhered thereto.
11. The process of claim 1 wherein step A includes the sub-steps of:
- 10 providing aerated confection pieces having a moisture content of about 1 to 5%;
heating the surface of the pieces to develop a sticky surface.
12. The process of claim 1 wherein the step B includes drying
15 the coated aerated confection pieces to a moisture content of 1 to 5%.
13. The method of claim 11 wherein step B includes cooling the coated aerated confection pieces to less than 100°F.
14. The process of claim 6 wherein the particles have a
20 particle size of about 15 to 2,000 microns.
15. The method of claim 9 wherein the water insoluble particles include food grade lake pigments.
16. The method of claim 8 wherein at least a portion of the particles include at least one nutritive carbohydrate
25 sweetener.
17. The method of claim 16 wherein at least a portion of the particles includes a sanding sugar.
18. The method of claim 1 wherein the aerated confection pieces have at least two colored portions.
- 30 19. The method of claim 18 wherein the aerated confection pieces having at least two colored portions are in a weight ratio of portions of 1:1.1 to 1:20.
20. The method of claim 6 wherein the weight ratio of particles to pieces ranges from about 1:100 to about 50:100.

20

21. The method of claim 6 wherein at least a portion of the particles is supplied by a colored hydrophilic colloid.
22. The method of claim 21 wherein at least a portion of the colored hydrophilic colloid is gum Arabic.
- 5 23. The method of claim 17 wherein at least a portion of the nutritive carbohydrate sweetener is sucrose.
24. The method of claim 17 wherein the nutritive carbohydrate sweetener includes dextrose.
25. The method of claim 23 wherein the sucrose is of a color
10 other than white.
26. The method of claim 15 wherein the water soluble particles include water soluble dyes.
27. The method of claim 21 wherein in step A the aerated confection pieces have a moisture content of about 1 to 5%.
- 15 28. The method of claim 21 wherein in step A the aerated confection pieces have a moisture content of about 12 to 30%.
29. The method of claim 28 wherein the particles include a hydrophilic colloid.
30. The method of claim 28 wherein the particles included gum
20 Arabic.
31. The method of claim 30 wherein the particles of gum Arabic include a fraction of a first color and a fraction of a second color.
32. The method of claim 31 wherein the particles are in the
25 form of flakes and have a particle size of between about 5 to 50 micron.
33. The method of claim 32 wherein the weight ratio of coating particles to pieces ranges from about 1:100 to about 3:100.
- 30 34. The method of claim 33 wherein step C includes drying the coated confection pieces to a moisture content of about 1 to 5%.
35. The method of claim 7 wherein the particles include colored starch.

21

36. The method of claim 6 wherein the particles comprise dextrose.
37. The method of claim 36
- 5 A. wherein in step A the pieces have a moisture content of about 15% to 30%;
- B. wherein in step C the pieces are dried to a moisture content of about 1% to 5%; and,
- additionally comprising the step of:
- 10 C. heating the dried coated pieces to melt the dextrose and cooling to room temperature to form a shiny coating.
38. The method of claim 37 wherein step D employs infrared heat.
39. The method of claim 37 wherein the heating step is continued for about 5 to 15 seconds.
- 15 40. The method of claim 1 wherein step A includes applying a vegetable oil to the confection pieces.
41. The method of claim 40 wherein the vegetable oil is applied at about 1 to 3% of the coated pieces.
42. The method of claim 41 wherein at least a portion of the
- 20 particles are water soluble dyes.
43. The method of claim 41 wherein the pieces have a moisture content of about 1 to 5%.
44. The method of claim 41 wherein the vegetable oil is soybean oil.
- 25 45. The method of claim 1 wherein the pieces comprise a calcium ingredient.
46. The method of claim 1 wherein the pieces have a fat content of less than about 0.5%.
47. The method of claim 1 wherein the pieces have a fat
- 30 content of about 1 to 30%.
48. The method of claim 47 wherein the coated pieces have a fat content of about 1 to 15%.
49. The method of claim 1 wherein the particles are applied in the form of a graphic pattern.

22

50. The product prepared by the process of claim 1.
51. The product prepared by the process of claim 2.
52. The product prepared by the process of claim 7.
53. The product prepared by the process of claim 9.
- 5 54. The product prepared by the process of claim 10.
55. The product prepared by the process of claim 11.
56. The product prepared by the process of claim 17.
57. The product prepared by the process of claim 19.
58. The product prepared by the process of claim 30.
- 10 59. The product prepared by the process of claim 49.
60. An aerated food product having a body exterior surface characterized by at least a portion of which has been modified to provide an appearance different from the body, comprising:
- 15 a body fabricated from an aerated confection composition comprising:
- about 50 to 98% of a saccharide component;
- about 1 to 5% moisture;
- about 0.5 to 30% of a structuring agent;
- 20 said body having a shape, having at least one color, and having an external surface, and wherein at least a portion the external surface has a distinguishing feature differing from the body in color, texture or structure, and wherein said food product has a density of about 0.1 to 1.0g/cc.
- 25 61. The aerated food product of claim 60 wherein the distinguishing feature comprises a shiny skin.
62. The aerated food product of claim 60 wherein the body is in the form of a wafer.
63. The aerated food product of claim 2 wherein the body in
- 30 the form of a wafer has a thickness of about 4 to 10 mm.
64. The aerated food product of claim 60 wherein the distinguishing feature includes at least a portion of the surface having a particulate coating wherein the coating is of a different color from at least a portion of the body.

65. The aerated food product of claim 64 wherein the particulate coating includes a water soluble carbohydrate.
66. The aerated food product of claim 60 wherein the particulate includes a water insoluble carbohydrate.
- 5 67. The aerated food product of claim 64 wherein the weight ratio of particulate coating to body ranges from about 0.1:100 to about 30:100.
68. The aerated food product of claim 67 wherein the particulate coating has a particle size of about 1 to 2,000
10 microns.
69. The aerated food product of claim 68 wherein the particulate coating comprises a first portion of a first color and at least a second portion of a second color.
70. The aerated food product of claim 69 wherein the first
15 and second particulate coatings are fabricated from a soluble carbohydrate.
71. The aerated food product of claim 70 wherein at least particulate coating portion is fabricated from colored sucrose particles.
- 20 72. The aerated food product of claim 60 wherein the body has at least two colored portions.
73. The aerated food product of claim 60 wherein the composition additionally comprises about 1 to 30% of a nutritionally fortifying ingredient.
- 25 74. The aerated food product of claim 73 wherein at least a portion of the nutritionally fortifying ingredient is an insoluble calcium material having a particles size of less than 250 microns.
75. The aerated food product of claim 74 wherein the
30 composition comprises sufficient amounts of an insoluble calcium material to provide a total calcium content of about 100 to 2500 mg/oz.
76. The aerated food product of claim 60 wherein the composition has a fat content of less than about 0.5%.

77. The aerated food product of claim 60 additionally comprising about 1 to 30% of a fat.
78. The aerated food product of claim 60 wherein the foam structuring agent includes gelatin.
- 5 79. The aerated food product of claim 60 wherein the composition saccharide component comprises about 1 to 15% cornstarch.
80. The aerated food product of claim 60 in the form of pieces having a piece count of about 3 to 6 pieces per gram.
- 10 81. The aerated food product of claim 60 in the form of pieces each weighing about less than 2.5g.
82. The aerated food product of claim 81 having a piece count of about 4 to 8 per gram.
83. The aerated food product of claim 60 wherein the pieces
15 have at least two phases characterized by different colors, flavors or composition.
84. The aerated food product of claim 66 wherein the water insoluble carbohydrate includes colored agar.
85. The aerated food product of claim 84 wherein the colored
20 agar is in the form of flakes having a particle size of about 5 to 200 microns.
86. The aerated food product of claim 85 wherein the ratio of particulate coating to body ranges from about 1:100 to about 5:100.
- 25 87. The aerated food product of claim 86 wherein the body has a moisture content of about 1 to 6%.
88. The aerated food product of claim 86 wherein the colored agar comprises a plurality of colors.
89. The aerated food product of claim 65 wherein the water
30 soluble carbohydrate includes a sanding sugar.
90. The aerated food product of claim 89 wherein the ratio of particulate coating to body ranges from about 15:100 to 30:100.

25

91. The aerated food product of claim 90 wherein the sanding sugar comprises a plurality of colors.
92. The aerated food product of claim 91 wherein the body has a moisture content of about 1 to 6%.
- 5 93. The aerated food product of claim 93 in the form of pieces weighing about 0.1 to 0.25g.
94. The aerated food product of claim 93 having a density of about 0.1 to 0.4g/cc.
95. The aerated food product of claim 64 wherein the
- 10 particulate coating includes a flavorant.
96. The aerated food product wherein the particulate coating includes a water soluble sugar.
97. The aerated food product of claim 96 wherein the water soluble sugar is sucrose.
- 15 98. The aerated food product of claim 97 wherein the sucrose is powdered sugar.
99. The aerated food product of claim 97 wherein the weight ratio of flavorant to sucrose ranges from about 1:1 to 1:3.
100. The food product of claim 99 wherein the flavorant is
- 20 cinnamon.
101. The food product of claim 64 wherein the particulate coating includes about 1 to 3% of an edible oil.
102. The food product of claim 101 wherein the edible oil is uncolored soybean oil.
- 25 103. The aerated food product of claim 67 wherein the particulate coating is provided by an edible ink.
104. The aerated food product of claim 10 wherein the particulate coating is in the form of a graphic picture.
105. The aerated food product of claim 104 wherein the graphic
- 30 picture is monochrome.
106. The aerated food product of claim 104 wherein the graphic picture comprises a plurality of colors.
107. The aerated food product of claim 103 wherein the body has at least two opposed major surface faces and wherein the

26

- edible ink is on at least one of the opposed major surface faces.
108. The aerated food product of claim 107 wherein the aerated confection composition has a moisture content of about 10 to
- 5 20%.
109. The aerated food product of claim 108 wherein the aerated confection composition has a white color.
110. The aerated food product of claim 109 wherein the body is in the form of pieces each weighing about 1 to 5g. and having
- 10 a density of about 0.1 to 0.4g/cc.
111. The aerated food product of claim 103 wherein the body has a shiny skin and wherein the edible ink overlays at least a portion of the shiny skin.
112. The aerated food product of claim 64 wherein the
- 15 particulate coating includes a water soluble dye.
113. The aerated food product of claim 64 wherein the particulate coating includes an insoluble lake colorant.
114. The aerated product of claim 113 wherein the particulate coating includes a water soluble dye.
- 20 115. The product of claim 114 wherein the weight ratio of water soluble dye to insoluble lake colorant ranges from about 5-15:100.
116. The food product of claim 114 wherein the water soluble dye and the insoluble colorant are of different colors.
- 25 117. The method of claim 5 wherein step A includes the substep of tumbling the aerated confection pieces with added moisture to provide the aerated confection pieces with the external sticky surface.
118. The method of claim 117 wherein at least a portion of the
- 30 added moisture is provided by a binder solution containing water and a binding agent.
119. The method of claim 10 comprising:

1/1

applying particles of a coating at least a fraction of which have a second color to adhere the particles to the sticky portion of the surface; and, processing the coated aerated confection pieces into shaped non-sticky coated pieces.

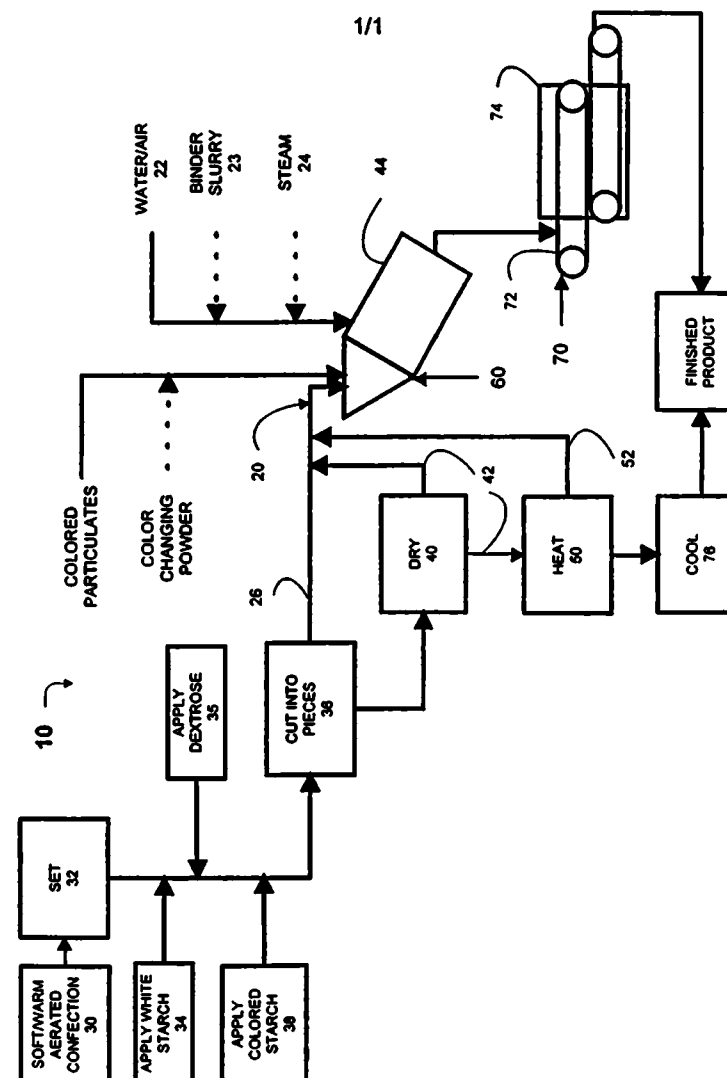
121. The method of claim 3 wherein the substance comprises particles.

15 123. The method of claim 1 wherein the aerated pieces are made sticky with heat.

124. The method of claim 1 wherein the aerated pieces are made sticky with moisture.

125. The method of claim 122 wherein the particles are made
20 sticky with heat.

126. The method of claim 122 wherein the particles are made sticky with moisture.



United States Patent [19]

Calandro et al.

(11) Patent Number: 4,755,390

(43) Date of Patent: Jul. 5, 1988

U.S. Patent

Jul. 5, 1988

4,755,390

[54] PROCESS FOR THE PRODUCTION OF A FLAVORED CEREAL PRODUCT

[75] Inventors: Thomas P. Calandro, Paterson, N.J.; Richard DeLauder, Randolph, N.J.; Marsha K. Verrico, Fair Lawn, all of N.J.

[73] Assignee: Nabisco Brands, Inc., Parsippany, N.J.

[21] Appl. No.: 736,332

[22] Filed: May 21, 1985

[51] Int. Cl. A23P 1/08

[52] U.S. Cl. 426/293; 426/620

[56] Field of Search 426/93, 96, 103, 619-621, 426/292, 293

References Cited

U.S. PATENT DOCUMENTS

2,020,257 7/1933 Dickinson
2,196,395 4/1940 Kellogg
2,333,442 11/1943 Rex
2,607,691 8/1952 Bettman 426/293
2,946,689 7/1960 Pital
3,094,947 6/1963 Oran 426/293
3,395,022 7/1968 Volcik et al.

3,557,718 1/1971 Chivers
3,561,981 2/1971 Roe et al
3,615,676 10/1971 McKown 426/293
3,840,685 10/1974 Lyall et al 426/93
4,089,984 5/1978 Gilbertson
4,199,603 4/1980 Sortwell, III
4,289,790 9/1981 Bruelle
4,338,339 7/1982 Edwards 426/96

FOREIGN PATENT DOCUMENTS

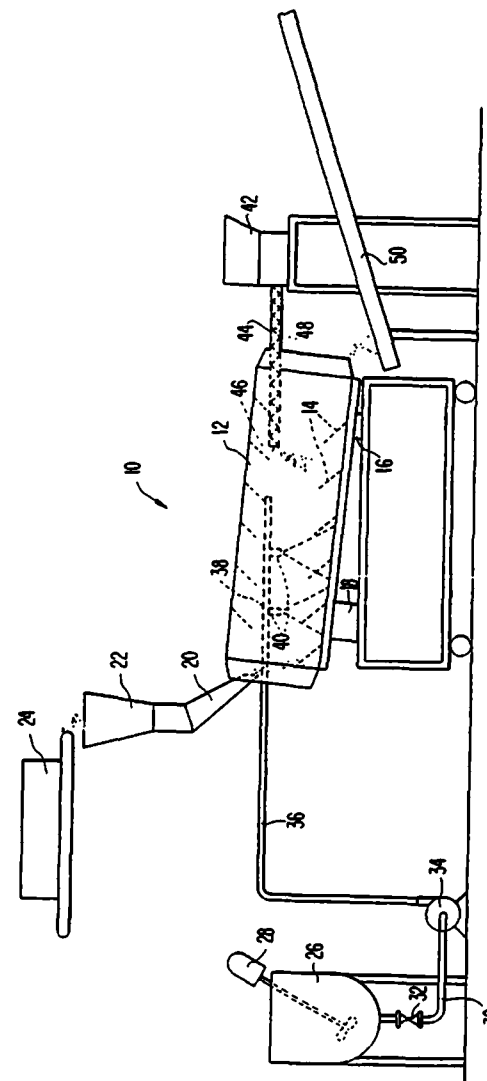
898885 8/1984 Belgium
1327350 8/1973 United Kingdom
1437501 5/1976 United Kingdom

Primary Examiner—Donald E. Czaja
Assistant Examiner—Carolyn Paden
Attorney, Agent, or Firm—Richard Kornutik

ABSTRACT

A flavor-coated cereal capable of releasing its flavor coating into milk in which it is immersed is produced by wetting the surface of a cereal product with a sugar solution, sprinkling a particulate flavoring composition (for example, ground hard candy) onto the cereal product while it is still wet with the sugar solution, and then drying the cereal product.

14 Claims, 1 Drawing Sheet



PROCESS FOR THE PRODUCTION OF A FLAVORED CEREAL PRODUCT

BACKGROUND OF THE INVENTION

I Field of The Invention

This invention relates to a flavored cereal product and to a process and apparatus for the production thereof. More specifically, this invention relates to a flavored cereal product comprising a cereal product to the surface of which is adhered a particulate flavoring composition.

II Description of The Prior Art

One major market for cereal products is of course breakfast cereals. Such breakfast cereals may be in the form of flakes or in shredded form. Alternatively the cereals may be made by gun-puffing the cereal or by extruding a cereal product at relatively high temperatures with a sudden release of pressure, so that the cereal product "puffs" to give a product of low density. Such cereal products can be made with a crunchy texture which makes them highly attractive for use as breakfast cereals. However, unless some additional flavorant is incorporated into the cereal product, its taste tends to be rather bland. Accordingly, in order to enhance the consumer appeal of the product, especially to children, manufacturers desire to add flavorants to cereal products. In theory, one might incorporate a flavorant into an extruded cereal product simply by mixing the flavorant with the dough from which the cereal product is prepared so that the flavorant becomes incorporated prior to extrusion of the cereal product. However, in practice such incorporation of the flavorant prior to the extrusion is likely to be beset with serious problems because the temperatures and pressure changes involved in the extrusion process may cause chemical changes in the flavorant. Moreover, incorporating the flavorant into the dough would result in uniform distribution of the flavorant throughout the cereal product, which effectively results in wasting most of the flavorant, since the flavorant in the interior of the cereal product will not be released, or hence tasted, during consumption of the product. Accordingly, in flavoring an extruded cereal product it is desirable to concentrate most of the flavorant on the surface, where it can exert its maximum sensory effect. With the other forms of cereal product mentioned above, it is in practice again most convenient to flavor the cereal product after the product reaches its final physical form.

The prior art describes numerous methods for combining one food with a flavoring material, and for coating food products with flavoring or other materials. For example, U.S. Pat. No. 2,020,257 to Dickins describes a fruit-flavored breakfast cereal comprising a cereal in flaked or shredded form and a partially-dried fruit in finely divided condition, the two being united by heating the fruit until the natural cementitious constituents of the fruit are rendered sticky, so that the fruit adheres to the cereal.

U.S. Pat. No. 2,946,689 issued July 26, 1960, to Pikal describes a caramel-coated apple produced by applying a surface coating of caramel confection to an unpeeled apple and then embedding a overcoated layer of a confectioned confection, for example, a nut meat, in the layer of caramel.

U.S. Pat. No. 4,199,603 issued Apr. 22, 1982 to Sorrell describes frozen food products, such as fish, poultry and vegetable products, suitable for micro-wave or

oven cooking, which are prepared by coating frozen portions of the food products with an edible oil containing a moisture-absorbent and then applying to the coated portions finely divided hygroscopic, crisp, particulate materials such as toasted cereal or carbohydrates, so that upon cooking of the food product the outer layer gives an appearance of a fat-fried product.

U.S. Pat. No. 4,089,984 issued May 16, 1978 to Gilbertson, describes a process for coating breakfast cereal in which the cereal is first coated with honey and/or corn syrup and then a finely divided edible material, which can be protein, wheat germ, dextrose or caseinate, is sprinkled on the sticky, syrup-coated cereal. The solid, finely-divided coating material serves to keep the pieces of cereal separate from one another, since the honey and corn syrup used are practically impossible to dry on the surface of the cereal.

U.S. Pat. No. 4,289,790 issued Sept. 15, 1981 to Brueille, describes a storage-stable confection produced by coating a core of cereal, dried fruit or nuts with alternative layers of chocolate and gasified candy. To protect the core from the fats in the chocolate, the core may be caramelized by coating it with a sugar before applying the chocolate and gasified candy. The product is stated to provide all the desired qualities of crunchiness, sizzle and chocolate flavor.

U.S. Pat. No. 2,196,395 issued Apr. 9, 1914, to Kellogg, describes a process for candy-coating cereal in which the cereal is mixed with a hot sugar solution containing a fat or oil; the sugar solution can be in the form of molasses, glucose or cane sugar. The process is designed to permit the sugar-coating of relatively fragile cereal products, such as flakes, which may be damaged by other coating techniques, and is also stated to give the product good storage stability.

U.S. Pat. No. 2,333,442 issued Nov. 2, 1943 to Rex, describes the coating of a puffed cereal product with a honey-flavored candy coating. The coating is produced by contacting the cereal product with a hot solution containing sugar, honey flavoring and hardening agents. Following coating, the coated cereal is cooled very rapidly to produce separation of the individual grains of sugar. It is stated that the process produces a hard coating which maintains its integrity and texture for indefinitely long periods of time without disintegration or conversion into a different form of sugar.

U.S. Pat. No. 3,395,022 issued July 30, 1968 to Vol-link et al, describes a breakfast cereal containing freeze-dried fruit which is not attached to the cereal, the two simply being mixed, so that the fruit can be rehydrated when the fruit is immersed in milk.

U.S. Pat. No. 3,561,981 issued Feb. 9, 1971 to Roe et al, describes a method of coating a breakfast cereal in which the cereal is first coated with a binder, preferably sugar syrup, and while the binder is still tacky a dry flavoring composition in the form of a dry or powdered ice cream mix is sprinkled onto the surface of the cereal.

U.S. Pat. No. 3,557,718 issued Jan. 26, 1971 to Chivert, describes a process for coating breakfast cereal or popcorn in which the substrate is first coated with a sugar slurry made by mixing ground particles of candy floss with a limited amount of water. The wet, slurry-coated cereal or popcorn may then have ground candy floss and/or ground nut meat sprinkled on its surface. Finally, the coated cereal is heated so as to fuse the candy floss into a continuous glaze surrounding the particles of cereal or popcorn. This process is stated to

endow the cereal with the color and flavor of the candy floss, and also to permit coating of difficult, fragile materials, such as cereal flakes, which cannot conveniently be coated by other processes using heavy sugar syrups.

Belgian Pat. No. 898885, published Aug. 10, 1984, and claiming priority of U.S. patent application Ser. No. 522,428 filed Aug. 11, 1983, describes a process for the preparation of a filled composite food product, in this process a mixture of large dry solid pieces having clear external surfaces and small pieces are placed in a receptacle, a non-sticky, low viscosity liquid is charged into the receptacle, and the resultant bed of large and small pieces is agitated so that the small pieces slide over the surfaces of the large pieces and become concentrated in the hollows or cavities of the large pieces. The resulting composite pieces are then dried so that the small pieces become bound in the hollows or cavities of the large pieces. This method has the disadvantage that, because it depends upon the small pieces sliding into the hollows or cavities of the large pieces, it is not suitable for coating large pieces in forms which lack such hollows or cavities.

There is one important distinction between breakfast cereals and most other foods as regards the environment in which the food is placed immediately prior to consumption which affects the choice of method for flavoring the cereal, namely that: breakfast cereals are normally immersed in milk before consumption, whereas other foods, for example, the caramel-coated apples, disclosed in Pikal, are normally eaten dry. Although the point does not seem to have been appreciated in the prior art, this immersion of the breakfast cereal in milk offers the possibility of greatly enhancing the effectiveness of a flavorant incorporated in a breakfast cereal. If the flavorant could be applied to the surface of the cereal in such a way that, upon immersion of the cereal into milk, at least part of the flavorant would dissolve in the milk, this release of flavorant into the milk would lead to a greatly enhanced flavor sensation by the consumer of the cereal, as compared with a flavorant which remained on the surface of the cereal despite immersion in the milk. Furthermore, if the flavorant could be applied to the cereal in such a way that it would dissolve in the milk, flavorants could be used which would otherwise be unacceptable because their presence on the surface of milk-saturated cereal would produce a texture unacceptable to the consumer. Accordingly, this invention provides a flavor-coated cereal product in which a flavorant is present on the surface of a cereal product in such a form that it will at least partially dissolve upon immersion of the cereal product in milk. The present invention also provides a process and apparatus for the production of such a flavor-coated cereal product.

SUMMARY OF THE INVENTION

This invention provides a process for flavoring a cereal product in which a sugar solution is placed on the surface of the cereal product. Then, while the cereal product is still wet with the sugar solution, the cereal product is brought into contact with a particulate flavoring composition soluble in milk and comprising a flavorant dispersed in a sugar matrix, thereby causing particles of the flavoring composition to adhere to the wet surface of the cereal product. Finally, the cereal product is dried without substantial melting of the flavoring composition particles so that the particles of the

flavoring composition become attached, by means of the dried sugar solution, to the surface of the cereal product but do not become fused to one another. Thus, upon immersion of the cereal product in milk the particles of the flavoring composition will at least partially dissolve in, and release flavor into, the milk.

This invention also provides a flavored-coated cereal product comprising a particle of cereal product, a layer of sugar crystals covering and adhering to at least part of the surface of the particle, and discrete particles of a flavoring composition embedded in the layer of sugar crystals and thereby held on the surface of the cereal product. The flavoring composition used is soluble in milk, comprises a flavorant dispersed in a sugar matrix, and preferably has an average particle size of from about 0.01 to about 0.15 inch (0.25 to 3.8 mm.), or about 10 to about 50 U.S. mesh.

Finally, this invention provides an apparatus for coating a cereal product with a particulate flavoring composition. This apparatus comprises a drum having an inlet end with an inlet for the cereal product and an opposed, outlet end provided with an outlet for flavor-coated cereal product, this drum being rotatable. At least one spray head is disposed adjacent the inlet end of the drum and arranged to spray liquid on to cereal product within the drum. The apparatus also comprises a device for supplying particulate flavoring composition to the drum, this device comprising a hopper and a screw conveyor connected at its one end to the hopper and at its opposed end to an outlet arranged to feed the particulate flavoring composition into the drum. The outlet of the device is disposed within the drum between the spray head and the outlet end of the drum. The drum is disposed so that, when it is rotated, cereal product entering its inlet will pass the spray head and then the outlet through which the particulate flavoring composition is applied to the drum and finally will leave the drum via the outlet thereof.

BRIEF DESCRIPTION OF THE DRAWING

The accompanying drawing is a schematic side elevation of an apparatus of the invention.

DETAILED DESCRIPTION OF THE INVENTION

From the foregoing Summary of the Invention, it will be seen that the process of the invention uses a sugar solution as an "adhesive" to stick particles of a flavoring composition on to the surface of a cereal product. The surface of the cereal product is first coated with the sugar solution and then, while still wet, is contacted with the particulate flavoring composition, which adheres to the wet surface of the cereal product because of the inherently sticky nature of the sugar solution. Finally, the coated cereal product is dried without melting the particles of flavoring composition, thereby causing the sugar solution to evaporate and form a layer of sugar crystals on the surface of the cereal product so that the discrete particles of the flavoring composition are embedded in this layer of sugar crystals, (and visible on the surface of the cereal product) and hence attached to the underlying cereal product, but upon immersion of the cereal product in milk the particles of flavoring composition are free to at least partially dissolve in the milk, thus releasing their flavorant into the milk and enhancing the consumer's flavor perception. Thus, coating of the cereal with the flavorant composition by the process of the invention enhances the flavor percep-

92

92

tion which can be achieved using a given quantity of flavoring composition. Alternatively, the process of the invention may enable one to reduce the amount of flavoring composition needed to achieve a desired degree of flavoring. Since the flavoring composition will normally be one of the more expensive components of the flavored cereal product, at least on a cost per unit weight basis, the process of the invention thus offers the possibility of significant cost reduction in the flavored cereal product.

If desired, the sugar solution used in the process of the invention may itself contain a flavorant; the inclusion of such a flavorant in the sugar solution, and hence in the layer of sugar crystals in the final product, serves as a "flavor booster" to enhance the flavor of the final product. The flavorant provided in the sugar solution may be the same as, or different from, the flavorant in the flavoring composition. Thus multi-flavor cereals may easily be prepared by using different flavors in the sugar solution and the flavoring composition.

Cereal products suitable for coating by the process of the invention are well known to those skilled in the art and hence it is unnecessary to describe in detail the production of such cereal products. The choice of an appropriate flour and other components of the dough used to form the cereal products is of course governed largely by the taste and texture desired in the final coated cereal product. It has been found that doughs based on corn flour, oat flour, rice flour and wheat flour give good results in the process of the invention. However, especially when the flavorant in the flavoring composition is to be a fruit flavor, the use of a dough based on whole wheat is not recommended, since it has been found that while wheat flavor in the cereal product does not give a good taste contrast with the fruit flavor in the flavoring composition, nor does it give a product with a very desirable appearance.

The exact geometric form of the cereal product subjected to the process of the invention is not critical and any of the forms of cereal product which will be familiar to those skilled in the art may be used. For example, the cereal product may be in flake form, shredded form, gun-puffed form or extruded form. When an extruded form is used, the extruded cereal product may be in the form of spherical pieces, such as those used in certain commercially-available breakfast cereals. However, it has been found that the form of extruded cereal product which best promotes adhesion of the particulate flavoring composition to the cereal product is cereal product in the form of toroidal pieces. Such toroidal pieces are commercially available and methods for the production thereof will be familiar to those skilled in the art.

The consumer appeal of the flavor-coated cereal product of the invention may be enhanced by introducing into the cereal product, prior to its coating, an edible food dye having a color associated with the flavor of the flavoring composition with which the cereal product is to be coated. For example, if a lemon-flavored coating is to be applied, a yellow dye can be introduced into the cereal product before coating. Methods for the introduction of edible food dyes in either liquid or solid form into cereal products are well known to those skilled in the art and hence will not be described here.

The success of the coating process of the invention is affected by the moisture content of the cereal product used. It has been found that, in general, it is desirable that the moisture content of the cereal product, prior to

contact with the sugar solution, be in the range of 1 to 10% by weight.

In order to ensure a uniform coating of the cereal product with the sugar solution, it is preferred that the sugar solution be applied to the cereal product by spraying. Most uniform application of the sugar solution is promoted by agitating a mass of particles of cereal product while spraying sugar solution onto the mass from above. Those skilled in the art of food technology will be familiar with rotatable drums provided with internal baffles which can be used to tumble or agitate and transfer a mass of particles of cereal product in a way that allows a coating to be very uniformly applied, and such drums are suitable for use in the application of the sugar solution in the process of the instant process.

Normally, it will be most convenient to coat the whole surface of the particles of cereal with the sugar solution. However, we do not absolutely exclude the possibility that the sugar solution might be applied only to part of the surface of the cereal particles, for example by dipping large particles into a shallow bath of the sugar solution.

The preferred concentration of sugar solution for use in the process of the invention is from 60 to 85% by weight. If the sugar solution is too dilute, it may be insufficiently sticky to promote adhesion of the flavoring composition to the cereal product and renders the drying of the product difficult and inefficient because of the large quantity of water which must be removed to deposit a given quantity of sugar. On the other hand, while if the sugar solution is too concentrated, it may become viscous, difficult to spray and difficult to apply uniformly in a thin layer to the cereal product.

It is desirable, though not absolutely essential, to incorporate an emulsified oil into the sugar solution. The presence of such oil produces better flow of the solution through any nozzle or spray heads used to spray the solution onto the cereal product. In addition, the presence of the emulsified oil promotes foaming of the sugar solution in contact with the cereal product. A foamy layer of sugar solution is desirable in order to assist in adhering the flavoring composition to the cereal product and to give a frosted appearance to the product. We have found that best results are obtained by incorporating from about 0.5 to about 5% by wt. of oil into the sugar solution. Obviously, the oil used must be edible and should also be relatively easy to emulsify in the sugar solution; it is preferred that vegetable oil such as sun flower oil or coconut oil be used. Preferably, the weight of sugar solution applied to the cereal product is from about 15 to 65% by wt. of the cereal product.

After the sugar solution has been applied to the cereal product, but while the cereal product is still wet with the sugar solution, the cereal product is contacted with a particulate flavoring composition comprising a flavorant dispersed in a sugar matrix, thereby causing particles of the flavoring composition to adhere to the wet surface of the cereal product. A suitable flavorant composition can be prepared by grinding a hard candy product into small particles. Any type of hard candy, for example, flavored hard rock candy, may be used.

The particle size of the particulate flavoring composition is of great importance in this invention. If the particle size is too small, the particles tend to melt in the subsequent drying step so that a continuous or semi-continuous layer of melted and resolidified flavorant composition occurs in the final flavor-coated cereal

product. Such a continuous or semi-continuous layer is undesirable, since it hinders dissolution of the particles in milk. If, on the other hand, the particle size is too large the particles will not sufficiently dissolve when the final product is immersed in milk prior to consumption. It is of course one of the advantages of the present invention that it permits the flavoring of cereal products with hard candy, a type of material which is otherwise difficult to incorporate into a cereal product.

The optimum particle size for any particular flavoring composition can easily be determined by routine empirical tests, and naturally this optimum particle size may vary somewhat depending upon the specific flavoring composition employed. However, in general it is preferred that the average particle size of the flavoring composition be in the range of 10 to 50 U.S. mesh. Moreover, desirably the sizes of the particles of flavoring composition are such that, upon immersion of the flavor-coated extruded cereal product in milk at 10° C. (50° F.), at least 50% of the flavoring composition will dissolve in the milk within three minutes.

After the cereal product has been coated with the flavoring composition, the product must be dried to evaporate water from the sugar solution, thus producing on the surface of the cereal product a layer of sugar crystals which bond the flavoring composition to the cereal product. Preferably, the drying is continued until the moisture content of the flavor-coated cereal product is from 1 to 6% by wt. Not only does such a degree of drying ensure firm adhesion of the flavoring composition, but it also produces a product with the requisite degree of storage stability and crispiness for human consumption. Since melting of the particles of flavoring composition during drying is to be avoided, it is necessary to avoid exposing the product to very high temperatures during the drying step, and hence it is preferred that hot air drying be used. During such hot air drying, the temperature of the product desirably should not exceed about 130° C., and drying is preferably effected in the temperature range of 95°-130° C., which is high enough to promote rapid drying without melting the flavoring composition.

Although the proportions of cereal product, sugar solution and particulate flavoring composition used in the preparation of the instant flavor-coated cereal product may of course vary with the exact nature of the various ingredients used, in general it is preferred that, of the final flavor-coated cereal product, the cereal comprise from about 35 to about 85% by wt., the sugar crystals comprise from about 15 to about 65% by wt. and the flavoring composition comprise from about 0.5 to about 4% by wt.

A cereal product of the invention having enhanced consumer appeal may be prepared by including a variety of flavors and colors therein. If a solid or liquid food dye is used to color the cereal product, to produce a mixture of different colors it will normally be necessary to color separate batches of the cereal product with the individual colors and then to mix these batches before or after coating with the flavoring composition.

To produce the mixture of flavors, separate batches of cereal product may of course be flavored separately. However, as noted above, the preferred method of introducing a plurality of flavors in the process of the present invention is to incorporate one or more flavors in the flavoring composition and one or more additional flavors in the sugar solution. For instance, as shown in the Example below an interesting product may be ob-

tained by preparing approximately equal quantities of orange-colored, yellow-colored and red-colored cereal products, wetting them with a sugar solution containing orange and lemon flavors and coating them with a cherry-flavored composition.

The accompanying drawing shows a schematic side elevation of an apparatus used to prepare the flavor-coated cereal product. This apparatus, generally designated 10, comprises a drum 12 which can be rotated about its own axis by a drive mechanism (not shown). The drum 12 is provided with internal baffles 14 fixed to its inner cylindrical surface and is mounted on supports, schematically indicated as 16 and 18, which are of different heights so that the axis of the drum 12 is inclined at an angle of about 5° to the horizontal.

Both ends of the drum 12 are left open. The left-hand end (in the drawing) of the drum 12 is the inlet end thereof, and is provided with a cereal inlet conduit 20 through which cereal product flows into the drum 12 from a hopper 22. The hopper 22 is itself fed by a cereal feeder 24 which may be, for example, one or more apparatus for producing or treating cereal product. Thus, the apparatus of the invention can easily be combined with, for example, an extrusion or gun-puffing apparatus, thereby enabling the extrusion or puffing and coating of the cereal product to be performed as a continuous process. As noted above, desirably the cereal product is dried to a moisture content of 1-10% by wt. before being subjected to the coating process and hence if necessary a dryer (not shown) may be connected between the cereal inlet conduit 20 and the associated hopper 22 in order to reduce the moisture content of the cereal entering the conduit 20 to its optimum value.

The inlet end of the drum 12 is provided with means for applying sugar solution to the cereal entering the drum 12 from the conduit 20, this means for applying sugar solution comprising a syrup tank 26 equipped with a stirrer 28, a pipe 30 extending from the tank 26 via a valve 32 to the inlet of a pump 34, a pipe 36 extending from the outlet of the pump 34 to a spray manifold 38 extending parallel to the axis of the drum 12 but disposed within the upper part thereof. The manifold 38 is also provided with a plurality of nozzles or spray heads 40 spaced along the length of the manifold 38 and arranged to direct sugar solution emerging therefrom downwardly on to cereal product lying in the lower part of the drum 12. For the sake of simplicity, only two spray heads 40 are shown in the drawing, though in practice a larger number will normally be employed.

The lower, right-hand (in the drawing) end of the drum 12 comprises the outlet end thereof through which the final, flavor-coated cereal product is discharged to a dryer. This outlet end of the drum 12 has a hopper 42 adjacent thereto, this hopper 42 serving to hold the particulate flavoring composition. A flavoring composition conduit 44 extends from the base of the hopper 42 to an outlet 46 positioned within the upper part of the drum 12 adjacent the outlet end thereof. It should be noted that manifold 38 which supplies the sugar solution terminates at a position such that there is a short gap between the end of the manifold 38 and the outlet 46 of the conduit 44. Within the conduit 44 is mounted an Archimedean screw conveyor 48 rotated by an electric motor (not shown). The screw conveyor 48 of course serves to convey the particulate flavoring composition from the base of the hopper 42 to the outlet

94

4,755,390

9

46, whence it is sprinkled on the cereal product resting in the base of the drum 12

The apparatus shown in the drawing operates as follows: Cereal product issuing from the cereal conduit 20 falls into the base of the drum 12 where it is sprayed with sugar solution issuing from the manifold 38 via the nozzles 40. The drum 12 is continuously rotated in use and this rotation, together with the baffles 14 provided on the interior of the drum, ensure that the cereal product is constantly tumbled so that it becomes uniformly coated with the sugar solution. The sloped axis of the drum 12 ensures that, as the cereal product is tumbled within the drum, it gradually slides from the inlet to the outlet end of the drum. The coating of the cereal product with sugar solution continues until the cereal product passes the end of the manifold 38. Shortly thereafter, the cereal product passes beneath the outlet 46 from which issues the particulate flavoring composition. At this stage, the cereal product is still wet with the sugar solution and hence the particulate flavoring composition issuing from the outlet 46 sticks to the wet surface of the cereal product. Moreover, the continuous rotation of the drum 12 and the action of the internal baffles therein continues the tumbling of the cereal product, so that the whole surface thereof becomes coated with the particulate flavoring composition. Finally, the flavor-coated cereal product leaves the outlet end of the drum 12, whence it is conveyed by a conveyor 50 to a forced hot-air dryer (not shown), for drying to a moisture content of 1 to 6% by wt.

The following Example is now given, though by way of illustration only, to show details of particularly preferred ingredients, proportions and techniques used in the instant invention

EXAMPLE

A flavor-coated extruded cereal product was produced using an apparatus as shown in the accompanying drawing having a diameter of 6 feet (1.83 m.) and an axial length of 8 feet 6 inches (2.59 m.). During the production of the flavor-coated extruded cereal product, the drum was rotated about its own axis by means of an electric motor at 25 rpm.

An extruded cereal product in the form of toroidal pieces approximately 2 cm in diameter was converted into a mixture of orange, yellow and red pieces using vegetable and natural dyes in liquid form. The coloring was affected by spraying batches of the cereal product with one of the dyes, and thereafter mixing the differently-colored batches to produce the desired mixture of colors. The dyed cereal product was fed at a rate of 300 lb. (136 kg) per hour through the cereal inlet conduit 20 into the drum. A sugar solution having a concentration of 80% by wt., containing approximately 2% by wt. of coconut oil, and containing orange and lemon flavors, was pumped at a rate of 2 lbs. (907 g) per minute through the manifold 38 and sprayed from four spray heads 40 provided on this manifold on to the tumbling mass of extruded cereal product resting in the base of the drum 12.

A cherry-flavored hard candy was ground in a ball mill to an average particle size of 0.05 inch (1.3 mm) and placed in the hopper 22. The ground candy was then fed at a rate of 1.5 lbs (680 g) per hour by means of the screw conveyor 48 along the conduit 44 and sprinkled from the outlet 46 of the conduit on to the tumbling extruded cereal product in the lower part of the drum 12, while the extruded cereal product was still

10

wet with the sugar solution. The flavor-coated extruded cereal product was removed from the outward end of the drum and passed to a conventional hot air dryer operated with an air inlet temperature of 115° C. and an exhaust temperature of 90° C., thereby producing a flavored extruded cereal product having a moisture content of approximately 2% by wt. This cereal product was a visually appealing breakfast cereal which, upon immersion in milk, produced within a few seconds a pronounced mixture of orange, lemon and cherry flavors in the milk. After a few seconds immersion in the milk, the mouth feel of the flavor-coated cereal product was equivalent to that of an uncoated product.

It will be apparent to those skilled in the art that numerous changes and modifications can be made in the preferred embodiments of the invention described above without departing from the scope of the invention. Accordingly, the whole of the foregoing description is to be construed in an illustrative and not in a limitative sense, the scope of the invention being defined solely by the appended claims.

We claim:

1. A process for flavoring a cereal product, which process comprises:
applying a sugar solution having a sugar concentration of from about 60 to about 85 percent by weight to the surface of the cereal product, while the cereal product is still wet with the sugar solution, contacting the cereal product with a particulate flavoring composition soluble in milk, the flavoring composition comprising a flavorant dispersed in a sugar matrix, the particle size of the flavoring composition being sufficiently large to prevent substantial melting during the subsequent drying step but sufficiently small to permit the particles of the flavoring composition to dissolve readily in milk, thereby causing particles of the flavoring composition to adhere to the wet surface of the cereal product; and

thereafter drying the cereal product at a temperature not exceeding about 130° C. without substantial melting of the particles of the flavoring composition thereon for a time sufficient to cause the particles of the flavoring composition to become attached, by means of the dried sugar solution, to the surface of the cereal product without fusing the particles to one another, so that, upon immersion of the cereal product in milk, the particles of the flavoring composition will at least partially dissolve in, and release flavor into the milk.

2. A process according to claim 1 wherein, prior to contact with the sugar solution, the moisture content of the cereal product is adjusted to about 1 to about 10 percent by weight.

3. A process according to claim 1 wherein the cereal product is formed using a flour selected from the group consisting of corn flour, oat flour, rice flour and wheat flour.

4. A process according to claim 1 wherein the cereal product is in flaked form, shredded form, gun-puffed form or extruded form.

5. A process according to claim 4 wherein the cereal product is an extruded cereal product in the form of substantially toroidal pieces.

6. A process according to claim 4 wherein the cereal product is an extruded cereal product in the form of substantially spherical pieces.

11

4,755,390

7. A process according to claim 1 wherein the sugar solution contains oil dispersed therein.

8. A process according to claim 7 wherein the dispersed oil comprises from about 0.5 to about 5 percent by weight of the sugar solution.

9. A process according to claim 1 wherein the weight of sugar solution applied to the cereal product is from about 15 to about 65 percent by weight of the cereal product.

10. A process according to claim 1 wherein the sugar solution contains at least one flavorant.

11. A process according to claim 10 wherein the flavorant in the sugar solution has a flavor different from that in the flavoring composition.

12. A process according to claim 1 wherein the flavoring composition has an average particle size in the range of 10 to about 50 U.S. mesh.

13. A process according to claim 1 wherein the weight of said flavoring composition adhered to the surface of the cereal product is from about 0.25 to about 4 percent by weight of the cereal product.

14. A process for flavoring a cereal product, which process comprises

12

adjusting the moisture content of the cereal product to about 1 to about 10 percent by weight, thereafter applying a sugar solution to the surface of the cereal product a sugar solution having a sugar concentration of from about 60 to about 85 percent by weight and comprising from about 0.5 to about 5 percent by weight of oil dispersed therein, while the cereal product is still wet with the sugar solution, contacting the cereal product with a particulate flavoring composition soluble in milk, this flavoring composition comprising a flavorant dispersed in a sugar matrix and having an average particle size of from 10 to 50 U.S. mesh, thereby causing particles of the flavoring composition to adhere to the wet surface of the cereal product, and thereafter drying the cereal product to a moisture content of from about 1 to about 6 percent by weight without melting the particles of flavoring composition thereon for a time sufficient to cause the particles of the flavoring composition to become attached to the surface of the cereal product without fusing the particles to one another, so that, upon immersion of the cereal product in milk, the particles of the flavoring composition will dissolve in, and release flavor into the milk.

94