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(71) Applicant *(for all designated States except US)*: **CADBURY ADAMS USA LLC** [US/US]; 389 Interpace Parkway, Parsippany, NJ 07054 (US).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **JANI, Bharat** [US/US]; 2 Montclair Court, East Brunswick, NJ 08816 (US).

(74) Agents: **ABBRUZZESE, Salvatore, J.** et al.; Hoffmann & Baron, LLP, 6900 Jericho Turnpike, Syosset, NY 11791 (US).

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(54) **Title:** METHOD AND APPARATUS FOR PROCESSING MULTIPLE CONFECTIONERY ROPES

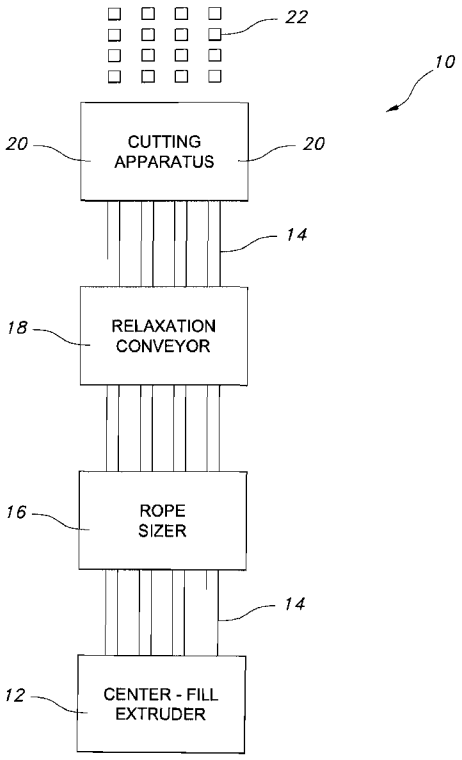

FIG. 1

(57) **Abstract:** The present invention includes a method and apparatus for manufacturing center- filled confectionery products. The method of forming center-filled confectionery products includes the steps of simultaneously extruding a plurality of individual, continuous tubular ropes of a first confectionery product, filling each of the tubular ropes with a second confectionery product, simultaneously feeding the multiple filled ropes into a cutting apparatus, and cutting the multiple-filled ropes in the cutting apparatus. The invention also includes an apparatus for manufacturing center-filled confectionery products, including an extruder for extruding multiple individual tubular ropes, a filling station, and a cutting apparatus.

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METHOD AND APPARATUS FOR PROCESSING MULTIPLE CONFECTIONERY ROPES

CROSS-REFERENCE TO RELATED APPLICATIONS:

This application claims priority to U.S. Provisional Application No. 60/952,256 filed July 27, 2007; the contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates generally to a method and an apparatus for forming individual center-filled confectionery pieces from a continuous rope or strand. More particularly, the present invention relates to a method and apparatus for forming several such center-filled confectionery pieces simultaneously via extrusion and cutting of several individual ropes of confectionery.

BACKGROUND OF THE INVENTION

Center-filled confectionery products are well known. These products typically have a solid or semi-solid exterior shell and a soft liquid or semi-liquid center. One well known example of such center-filled confectionery products are liquid-filled gum pieces.

One typical process for forming such center-filled confectionery products is to extrude a continuous rope or strand into a hollow-tubular configuration. The hollow rope is then filled with the soft or liquid confectionery product. Thereafter, the rope is traditionally processed in a longitudinally continuous fashion so as to size the rope and pass the rope between dies which continuously cut the rope into individual center-filled pieces. The process for forming such pieces and an apparatus for affecting the process is more fully shown and described in U.S. Patent Nos. 6,838,098; 6,558,727; 6,472,001 and 6,284,291. Each of these patents is incorporated by reference herein for all purposes.

While these processes and similar processes serve adequately form center-filled confectionery products such as center-filled gum, the speed and efficiency of the process is limited due to the fact that the rope must be fed individually into the forming apparatus which typically processes the rope in a linear fashion. The rope, being a rubbery material, has a tendency to longitudinally contract after it is extruded, due to natural forces, this is

comparable to a relaxation. The faster the product is extruded and reduced, the more likely it is to relax. With center filled products any longitudinal contraction after cutting may cause the center fill material to leak out of the product. Thus, there is a need to allow for an efficient process to produce gum, while avoiding the high shrinkage normally associated with preparation of such products.

It is desirable to provide a process and apparatus which more efficiently processes multiple ropes of individually extruded material simultaneously to increase the yield of the apparatus, while still allowing for such center-filled confectionery products to be sufficiently stable to prevent leakage. Further, it is desirable to provide a process and apparatus which more efficiently processes a rope of extruded material in such a fashion that reduces or eliminates the need to size and/or relax the rope prior to cutting.

SUMMARY OF THE INVENTION

The present invention provides a method and apparatus which processes multiple ropes of material to increase yield. The method of the present invention involves extruding multiple continuous tubular ropes of a first confectionery product, filling the tubular ropes with a second confectionery product, and simultaneously feeding the multiple filled ropes into a cutting apparatus, and simultaneously cutting the multiple filled ropes into center-filled confectionery products.

In an aspect of the invention, an apparatus for manufacturing center-filled confectionery products is provided, the apparatus including an extruder, which simultaneously extrudes a plurality of individual continuous tubular ropes of a first confectionery product, a filling apparatus for filling each rope with a second confectionery product, and a cutting apparatus, for simultaneously cutting the plurality of individual continuous ropes into individual pieces.

In another aspect of the invention, a method for manufacturing center-filled confectionery products is provided, the method including the steps of extruding a continuous tubular rope of confectionery product, filling the continuous tubular rope with a second confectionery product, and feeding the filled tubular rope into a cutting apparatus, where the rope is cut into individual pieces.

OVERVIEW OF THE INVENTION

In some embodiments, there is provided a method of manufacturing center-filled confectionery products including the steps of: extruding a plurality of individual, continuous tubular ropes of a first confectionery product; filling each of the tubular ropes with a second confectionery product; simultaneously feeding the multiple filled ropes into a cutting apparatus; and cutting the multiple-filled ropes in the cutting apparatus. Optionally, the filling step may include the step of supplying a volume of the second confectionery product from a container; and simultaneously injecting the second confectionery product from the container into the tubular ropes as they are extruded. In some embodiments, the injecting step further includes providing a plurality of injecting nozzles for injecting the second confectionery product into the tubular ropes.

The invention further provides an apparatus for manufacturing center-filled confectionery products including: an extruder, which simultaneously extrudes a plurality of individual, continuous tubular ropes of a first confectionery product; a filling apparatus, which fills each of the individual, continuous tubular ropes with a second confectionery product; and a cutting apparatus, which simultaneously cuts the plurality of individual, continuous ropes into individual pieces. If desired, the apparatus may additionally include a rope sizer.

In some embodiments, the method and apparatus described herein may further include the step of simultaneously sizing the multiple filled ropes. Additionally, the method and apparatus may include providing a time delay for passage of the multiple ropes between the sizing step and the cutting step. The time delay may be achieved by any desired means, such as through the use of at least one relaxation conveyor, through the use of multiple relaxation conveyors, or through the use of one relaxation conveyor, which is wide enough to transport a plurality of the continuous tubular ropes simultaneously. In some embodiments, the invention may include at least one swing arm to deposit the individual tubular ropes or multiple continuous tubular ropes onto the at least one relaxation conveyor.

If desired, the sizing step may include providing a plurality of rollers for accommodating the filled ropes; and simultaneously passing the tubular ropes between the rollers. Optionally, the rollers closest to the entry point of the tubular ropes may move slower

than the rollers towards the exit point of the tubular ropes. In addition, the rollers closer to the entry point of the tubular ropes may have a wider groove than the rollers towards the exit point of the tubular ropes.

In one particular embodiment, the cutting step may include providing a chain cutter, the chain cutter having a plurality of longitudinally aligned dies, wherein the chain cutter is wide enough to accommodate the plurality of multiple filled ropes in a side-by-side configuration. Optionally, the cutting step may include providing a chain cutter, the chain cutter having a plurality of longitudinally aligned dies, wherein the chain cutter is wide enough to accommodate the plurality of multiple filled ropes in a vertical configuration.

Optionally, the method and apparatus described herein may include the step of applying an anti-sticking agent to one or more of the components of the invention. For example, the invention may include applying an anti-sticking agent to the tubular rope after extrusion, or it may include applying an anti-sticking agent to the cutting apparatus, or to any other component desired. In some embodiments, the plurality of individual, continuous tubular ropes of a first confectionery product may be extruded simultaneously. Alternatively, the plurality of individual, continuous tubular ropes of a first confectionery product may be extruded in an alternating pattern.

In embodiments incorporating a filling apparatus, the filling apparatus may be located at a point substantially near the extrusion apparatus, such that each individual confectionery rope is filled at or near the time where it is extruded. Optionally, the filling apparatus may include a plurality of injecting nozzles for simultaneously injecting the second confectionery product into the tubular ropes.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a schematic drawing of the center-filled consumable product forming apparatus as described herein.

Figure 2 shows a close-up of one embodiment of the extruder, incorporating multiple extrusion nozzles.

Figure 3 shows a chain cutting apparatus as described in one embodiment of the invention.

Figure 4 shows a schematic arrangement of a plurality of chain cutters of Figure 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is directed to an apparatus for extruding continuous tubular ropes or strands of a first confectionery product. Embodiments described herein provide a multi-component composition which includes at least one center-fill region and a confectionery region. The individual confectionery piece may also include an outer coating or shell, which typically provides a crunchiness to the piece when initially chewed. The individual confectionery pieces may form a variety of shapes including pellet, tablet, ball, pillow, chunk, stick and slab, among others.

An extruder for extruding the continuous tubular ropes or strands of a first confectionery product is capable of extruding multiple individual tubular ropes of a center-filled confectionery product. The ropes may be of any shape or size desired, including circular, rectangular, or any other formation desired. In one embodiment, there are at least four simultaneously extruded tubular ropes; however any number of tubular ropes may be contemplated by the present invention. The tubular ropes are then simultaneously fed into a cutting apparatus for cutting individual pieces of center-filled confectionery products. This embodiment of the invention may incorporate several stages after extrusion, including a sizing step and a relaxation step.

In an alternate embodiment, the confectionery product may be extruded and fed directly into a cutting apparatus, such as a chain cutter. In this embodiment, the confectionery product may be extruded at substantially the correct size, and thus reducing or even eliminating the need for a rope sizing apparatus and/or a relaxation apparatus. Such extrusion may be performed by using a multiple extruder apparatus as described in U.S. Patent No. 5,698,233, which is fully incorporated by reference herein.

The Apparatus

The apparatus **10** which may be used in conjunction with the present invention is schematically shown in Fig. 1. The apparatus **10** includes an extruder **12**, which may extrude one or more center-filled ropes **14**. The extruder **12** may include one or more injection nozzles for injecting liquid center-fill product into a hollow tubular rope(s) **14**. The rope(s)

14 pass through a rope sizer **16**, more fully described herein below, which reduces the size of the extruded rope(s) **14**. The sized rope(s) **14** then pass to a relaxation conveyor **18**, which will also be described in further detail hereinafter. The relaxation conveyor **18** allows the rope(s) **14** to relax. Thereafter, the rope(s) **14** are moved through a cutting apparatus **20**, also more fully described below, which cuts the rope(s) **14** into individual pieces **22**. A similar apparatus such as that disclosed in Applicant's co-pending U.S. provisional application (entitled "Method and Apparatus for Processing Confectionery Products", Attorney Docket No. 1421-197P, filed July 27, 2007), which is fully incorporated by reference herein, may be used.

The Extruder

The present invention includes an extruder **12** which is capable of extruding a continuous tubular rope **14** of filled confectionery material. According to one aspect of the present invention, the extruder **12** is capable of continuously extruding a plurality of individual tubular ropes **14** of confectionery simultaneously. Preferably the tubular ropes **14** are extruded in a side-by-side fashion, but they may be extruded in a vertical manner, or in any other arrangement desired. According to the preferred embodiment of the invention, the extruder **12** extrudes four simultaneous tubular ropes **14**, but it is contemplated that any number of simultaneous ropes can be extruded.

Referring to Fig. 2, several tubular ropes **14** of material may be extruded individually, through the use of several extruder dies **12a**. Extruding multiple tubular ropes individually eliminates the need to separate the tubular ropes **14** at a later stage, such as would be required if the tubular ropes **14** are extruded as attached to each other.

In this embodiment, center-fill material **14a** may be injected into the tubular ropes **14** during the extrusion process. The center-fill material **14a** may be injected by center nozzles **13**, located concentrically within the extruder nozzles **12a**. While this is one technique that may fill the center-filled ropes **14**, any suitable filling technique may be employed. The center fill composition **14a** may be injected at any time desired, and preferably the center-fill composition **14a** is injected directly into the tubular rope **14** at the time that it is being extruded, or soon thereafter.

In one embodiment of the invention, once extruded from the multiple extruder **12**, the ropes **14** may be fed directly into the chain cutting apparatus **20**, with no need for further sizing or relaxing of the rope product **14**. Optionally, the product may be subjected to a time delay apparatus, such as a relaxation conveyor **18**, prior to being fed into the cutting apparatus **20**.

The extrusion may take place at any velocity desired. The velocity of the extrusion relates to the velocity of one or more of the other elements of the apparatus, including sizing, relaxation, and cutting velocities. Preferably, the extrusion feeds the rope product at a velocity of about 50 m/min to about 150 m/min, and more specifically at about 100 m/min.

The Cutting Apparatus

Any conventional means to cut the confectionery product into individual pieces can be used with the present invention. Preferably the invention uses a chain cutter apparatus with multiple dies to cut a plurality of individual pieces from the continuous filled rope. Such chain cutting apparatuses include those described in Applicant's co-pending PCT patent application (entitled "Chain cutter for continuously forming center-filled gum pieces", Attorney Docket No. 1421-182 PCT, filed June 29, 2007), which is fully incorporated by reference herein.

Referring now to Figure 1, the cutting apparatus **20** may be provided after use of the optional relaxation conveyor **18**; however the cutting apparatus **20** may be located after the optional rope sizer 1**6** or immediately after extrusion 1**2**. According to an aspect of present invention, multiple continuous ropes **14** are fed into the cutting apparatus **20**, wherein each rope **14** may be fed between the open die cavities **21** of multiple chain dies **19**. One such chain die **19** arrangement is shown in Figure 3. The die cavity portions **21** are then closed about the rope of product effectively forming and cutting the rope into a plurality of discrete pieces. The cutting apparatus **20** has a length as measured between the rollers **19b**, which may be substantially long enough to allow the product to remain within the closed die cavities to be formed.

As the individual closed die cavity **21**, which contains a piece of confectionery product within the cavity **21**, traverses from one end of the cutter to the other, the first region

of the product is effectively sealed. Such sealing is important with a center-filled gum product so as to prevent release of the liquid center from the formed piece.

The cutting apparatus may contain any number of individual die cavities **21**. Preferably the cutting apparatus has about 10 to about 20 individual die cavities **21** per rope of confectionery.

The cutting apparatus according to the invention should be sufficiently wide enough to allow multiple continuous tubular ropes **14** to be fed and cut simultaneously. Referring to Figure 4, a preferred multiple rope chain cutting apparatus is shown schematically. The cutting apparatus **20** has a plurality of longitudinally aligned cutting die cavities **21** along its length. The tubular ropes **14** may be fed into the cutting apparatus **20** in a side-by-side formation, spaced sufficiently far apart so as to allow for individual cutting. The ropes **14** may alternatively be fed into the cutting apparatus **20** vertically, or any other manner which allows multiple cuts to be made. Preferably, the apparatus **20** may be sufficiently wide enough to allow at least four tubular ropes **14** to be cut, but any number of ropes **14** may be simultaneously cut pursuant to the present invention.

Each chain die **19** includes a pair of chains **19a** supported between chain rollers **19b**, which define therebetween the die cavities **21**. The chain die is more fully described in the above-incorporated patent application.

The Rope Sizer

The present invention may optionally incorporate the use of an apparatus to size the ropes after they are extruded, called a "rope sizer" **16**. In traditional extrusion, the rope **14** is extruded at a size that is much thicker and larger than the end product. Thus, there may be a need for a proper sizing apparatus, which linearly extends the product, continuously stretching it out so that it is the right thickness and size.

Any rope sizing apparatus **16** may be used in the present invention, including that disclosed in Applicant's co-pending patent application (entitled "Method and Apparatus for Processing Confectionery Products", Attorney Docket No. 1421-197P, filed July 27, 2007), which has previously been incorporated by reference, may be used.

The preferred sizer **16** has a plurality of pairs of rollers, which have grooved openings to pull the rope product **14** through. As the gum goes through the rope sizer **16**, the speed of the pairs of rollers increases, so the last pair of rollers moves at a speed that may be several times faster than the first pair of rollers. In addition, the grooved openings of the latter pair of rollers get smaller, which help to size the rope **14** properly.

One aspect of the invention manufactures multiple confectionery ropes, using multiple rope sizing apparatuses **16**. The rope sizing pair of rollers may be side-by-side, may be vertically aligned, or may be arranged in any other formation that would allow the simultaneous sizing of multiple ropes of confectionery product. The rope sizer rollers may be connected to each other or they may be individually supported.

In one aspect of the invention, the rope sizing apparatus **16** may be located immediately after the tubular rope **14** has been extruded **12**. The tubular ropes **14** of this aspect are extruded individually, and thus there may be no need for a separating apparatus between the sizing and the extrusion stages of the process. In other aspects of the invention, the rope sizing apparatus **16** may not be required, such as by using the multiple extruder apparatus **12** as described previously, and feeding the ropes **14** directly into the cutting apparatus **20**.

The Relaxation Conveyor

The method and apparatus of the present invention may optionally use a relaxation conveyor **18** to aid in the formation of the individual gum pieces **22**. By "relaxation conveyor," it is contemplated that any mechanism to allow the tubular confectionery **14** to "relax" and contract in size prior to cutting may be used. The relaxation conveyor **18** provides a time delay between extrusion **12** and/or sizing **16** and cutting **20**, to allow the confectionery rope(s) **14** to get to a more stable form.

Any relaxation conveyors **18** may be used in the present invention, including those disclosed in Applicant's co-pending patent application (entitled "Method and Apparatus for Processing Confectionery Products", Attorney Docket No. 1421-197P, filed July 27, 2007), which has previously been incorporated by reference, may be used.

Preferably, the relaxation conveyor **18** incorporates the use of an optional swing arm, which feeds the confectionery rope(s) **14** onto the relaxation conveyor **18** in a non-linear path, such as a traditional wave pattern. In one aspect of the invention, the relaxation conveyor **18** may be located after the rope(s) **14** has been sized, such as through a rope sizing apparatus **16** as described previously, and before the rope(s) **14** is cut by the cutting apparatus **20**. In other aspects of the invention, the relaxation conveyor **18** is not required, such as by using the multiple extruder apparatus as previously described.

When multiple ropes **14** are extruded, the use of a very wide relaxation conveyor **18** may be contemplated, but the use of multiple conveyors may also be used. For example, when extruding four continuous and simultaneous confectionery ropes **14**, the ropes may be spread on the same relaxation conveyor **18**, which may be wide enough to encompass all four ropes. In contrast, the use of four individual relaxation conveyors **18** may also be contemplated, each of which may be used to simultaneously transport one confectionery rope each. Further, the use of any other number of conveyors **18** is also contemplated, such as using two relaxation conveyors **18**, each of which may be designed to transport two confectionery ropes **14**.

In addition, the use of multiple swing arms is likewise contemplated. The confectionery ropes **14** may each be deposited on the relaxation conveyor **18** or conveyors via one swing arm simultaneously, or they may be deposited on the relaxation conveyor **18** or conveyors via multiple swing arms. As with the relaxation conveyor **18** itself, any number of swing arms may be used, to deposit one or more ropes **14** simultaneously. The use of a swing arm is an optional feature, and may be avoided if desired.

The confectionery products described herein may be manufactured by use of the extruder **12**, rope sizer **16**, relaxation table **18**, and cutting apparatus **20**, or they may be manufactured by use of any combination of these elements. For example, in one aspect of the invention, the products described herein may be extruded and then fed directly into the cutting apparatus **20**. Further, the methods and apparatus described herein may be used to manufacture any number of confectionery ropes **14** simultaneously.

Optionally, an anti-sticking agent may be used in conjunction with the extruder **12**, rope sizer **16**, relaxation table **18**, and cutting apparatus **20**, to prevent the rope from adhering to the individual parts and getting stuck, which would decrease productivity. Generally, anti-sticking agents may be in the form of powders such as talc, calcium carbonate, or oils. For example, a fine mist of a food grade oil or an oil-based material may be sprayed on the rollers and material engaging surfaces of the rope sizer before or as the rope of gum material makes contact with the rollers. The oil temporarily reduces or eliminates the stickiness of the gum material and allows it to be sized without the need to cool the rollers with cooled air or nitrogen gas. In the alternative or in addition, it is also possible to apply the oil material directly on the rope of gum material. Suitable food grade oil or oil-based materials include, but are not limited to almond oil, apricot kernel oil, avocado oil, black cumin seed oil, borage seed oil, camellia oil, castor oil, cocoa oil, coconut oil, corn oil, cottonseed oil, evening primrose seed oil, grapeseed oil, hazelnut oil, hemp seed oil, jojoba oil, karanja seed oil, kukui nut oil, macadamia nut oil, meadowfoam seed oil, neem seed oil, olive oil, palm oil, peanut oil, pumpkin seed oil, rosehip seed oil, safflower oil, sea buckthorn oil, sesame seed oil, shea nut oil, soybean oil, sunflower oil, tamanu oil, vitamin E oil, and wheat germ oil. Synthetic oils may also be used. The anti-sticking agent may be applied to any individual part of the apparatus, or the rope **14** itself, to reduce sticking.

In an embodiment, the parts of the apparatus may be kept at a reduced temperature in order to prevent the confectionery material from sticking to the various parts described herein. For this purpose, cooled air or gas may be directed toward the rollers, the relaxation conveyor, the cutting apparatus, or any other part of the system in which the confectionery may potentially stick. The cooling air may flow directly at the surface of the parts to maintain it at a pre-determined temperature. In another embodiment, the parts themselves may be chilled, such as using a chilled extruder **12**, a chilled rope sizer **16**, a chilled relaxation conveyor **18** and/or a chilled cutting apparatus **20**. Such cooling may be achieved through use of cooled fluid, such as water, liquid nitrogen, or other fluid. In an embodiment, the center fill material may be cooled upon exit from the filling apparatus. Using cooled center fill material has the effect of cooling the outer confectionery portion from the inside. The temperature of the parts is preferably maintained below -90°F, although the actual temperature may vary with the material and production rate. The individual parts and/or the confectionery itself may be cooled at any temperature from about -100°F to about 50°F. In

order to control costs of manufacture, the temperature should be just cold enough to support production, while inhibiting sticking of the confectionery.

CLAIMS

What is claimed is:

1. A method of manufacturing center-filled confectionery products comprising the steps of:
extruding a plurality of individual, continuous tubular ropes of a first confectionery product;
filling each of said tubular ropes with a second confectionery product;
simultaneously feeding said multiple filled ropes into a cutting apparatus; and
cutting said multiple-filled ropes in said cutting apparatus.

2. A method of claim 1 further including the step of:
simultaneously sizing said multiple filled ropes.

3. A method of claim 2 further comprising:
providing a time delay for passage of said multiple ropes between said sizing step and said cutting step.

4. A method of claim 3, wherein said time delay is achieved through the use of at least one relaxation conveyor.

5. A method of claim 4, wherein said time delay is achieved through the use of one relaxation conveyor, which is wide enough to transport a plurality of said continuous tubular ropes simultaneously.

6. A method of claim 4, further comprising at least one swing arm to deposit said multiple continuous tubular ropes onto said at least one relaxation conveyor.

7. A method of claim 6, comprising one swing arm to deposit each individual continuous tubular rope onto said at least one relaxation conveyor.

8. A method of claim 1, wherein said filling step comprises the step of:
supplying a volume of said second confectionery product from a container; and

simultaneously injecting said second confectionery product from said container into said tubular ropes as they are extruded.

9. A method of claim 8, wherein said injecting step further comprises:
providing a plurality of injecting nozzles for injecting said second confectionery product into said tubular ropes.

10. A method of claim 2, wherein said sizing step further comprises:
providing a plurality of rollers for accommodating said filled ropes; and
simultaneously passing said tubular ropes between said rollers.

11. The method of claim 10, wherein the rollers closest to the entry point of the tubular ropes move slower than the rollers towards the exit point of the tubular ropes.

12. The method of claim 10, wherein the rollers closer to the entry point of the tubular ropes have a wider groove than the rollers towards the exit point of the tubular ropes.

13. A method of claim 1 wherein said cutting step further comprises:
providing a chain cutter, said chain cutter having a plurality of longitudinally aligned dies, wherein said chain cutter is wide enough to accommodate said plurality of multiple filled ropes in a side-by-side configuration.

14. The method of claim 1, wherein said cutting step comprises:
providing a chain cutter, said chain cutter having a plurality of longitudinally aligned dies, wherein said chain cutter is wide enough to accommodate said plurality of multiple filled ropes in a vertical configuration.

15. The method of claim 1, wherein said plurality of individual, continuous tubular ropes of a first confectionery product are extruded simultaneously.

16. The method of claim 1, wherein said plurality of individual, continuous tubular ropes of a first confectionery product are extruded in an alternating pattern.

17. An apparatus for manufacturing center-filled confectionery products comprising:
an extruder, which simultaneously extrudes a plurality of individual, continuous tubular ropes of a first confectionery product;
a filling apparatus, which fills each of said individual, continuous tubular ropes with a second confectionery product; and
a cutting apparatus, which simultaneously cuts said plurality of individual, continuous ropes into individual pieces.

18. An apparatus of claim 17 further comprising a rope sizer.

19. An apparatus of claim 17 further comprising:
a time delay apparatus for passage of said multiple ropes between said sizing step and said cutting step.

20. An apparatus of claim 19, wherein said time delay apparatus comprises at least one relaxation conveyor.

21. An apparatus of claim 17, wherein said filling apparatus is located at a point substantially near the extrusion apparatus, such that each individual confectionery rope is filled at or near the time where it is extruded.

22. An apparatus of claim 21 wherein said filling apparatus comprises a plurality of injecting nozzles for simultaneously injecting said second confectionery product into said tubular ropes.

23. An apparatus of claim 18 wherein said rope sizer comprises a plurality of rollers for simultaneously accommodating said plurality of continuous ropes.

24. The apparatus of claim 23, wherein the rollers closest to the entry point of the tubular ropes move slower than the rollers towards the exit point of the tubular ropes.

25. The apparatus of claim 23, wherein the rollers closer to the entry point of the tubular ropes have a wider groove than the rollers towards the exit point of the tubular ropes.

26. A method of claim 17, wherein said cutting step further comprises:
providing a chain cutter, said chain cutter having a plurality of longitudinally aligned dies, wherein said chain cutter is wide enough to accommodate said plurality of multiple filled ropes in a side-by-side configuration.

27. The method of claim 17, wherein said cutting step comprises:
providing a chain cutter, said chain cutter having a plurality of longitudinally aligned dies, wherein said chain cutter is wide enough to accommodate said plurality of multiple filled ropes in a vertical configuration.

28. The method of claim 17, further comprising a means for applying an anti-sticking agent to at least one of the rope and the apparatus.

29. A method of manufacturing center-filled confectionery products comprising the steps of:
extruding a continuous tubular rope of confectionery product;
filling said continuous tubular rope with a second confectionery product; and
feeding said filled-tubular rope into a cutting apparatus
wherein said confectionery products are formed without the use of a rope sizing apparatus after extrusion.

30. The method of claim 29, further comprising the step of:
providing a time delay between the extrusion and feeding the rope into said cutting apparatus.

31. The method of claim 30, wherein said time delay is achieved through the use of a relaxation conveyor.

32. The method of claim 29, wherein said extrusion is achieved through the use of a multiple extruder.

33. The method of any of claims 1 or 29, further comprising a means for applying an anti-sticking agent to at least one of the tubular rope and the cutting apparatus.

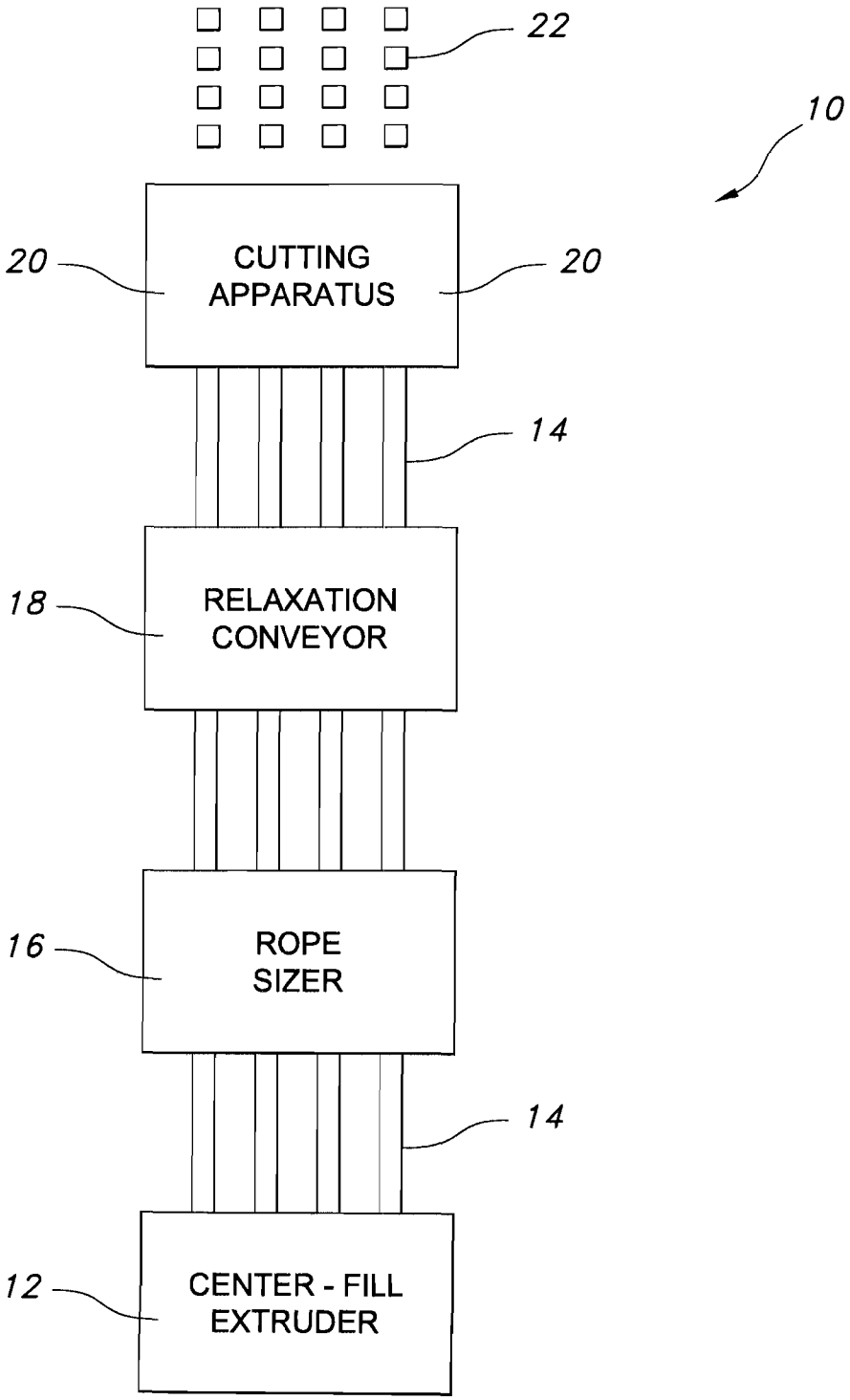
22
10
20
CUTTING APPARATUS
20
14
18
RELAXATION CONVEYOR
16
ROPE SIZER
14
12
CENTER - FILL EXTRUDER

FIG. 1

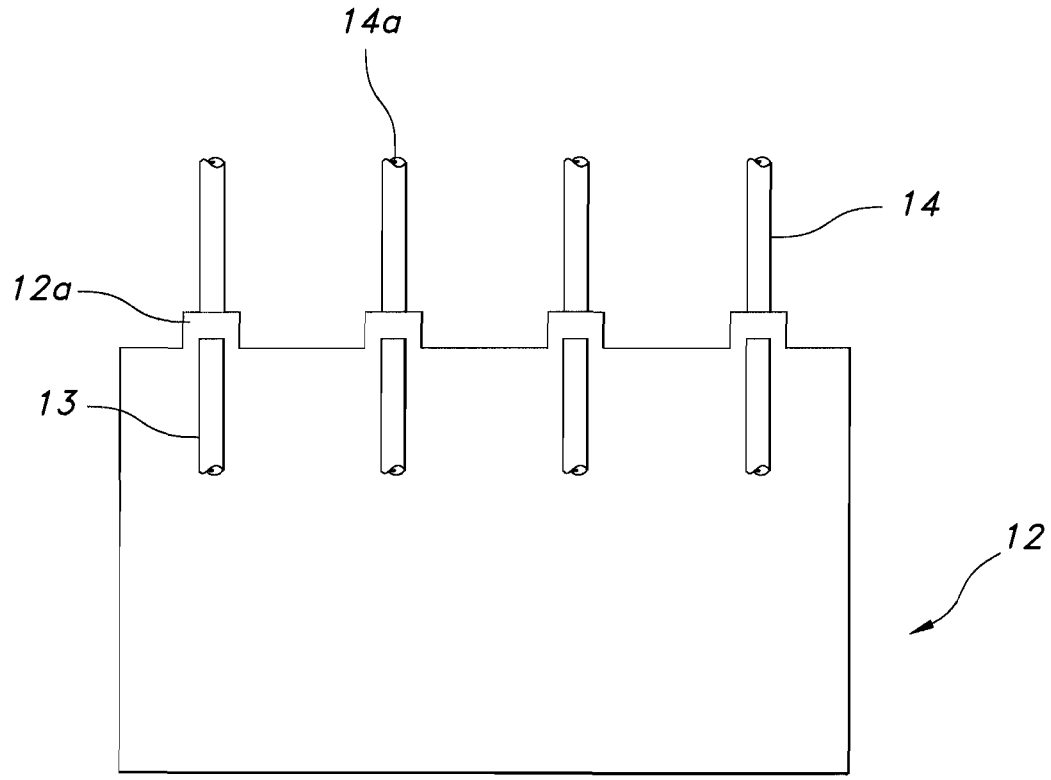

FIG. 2

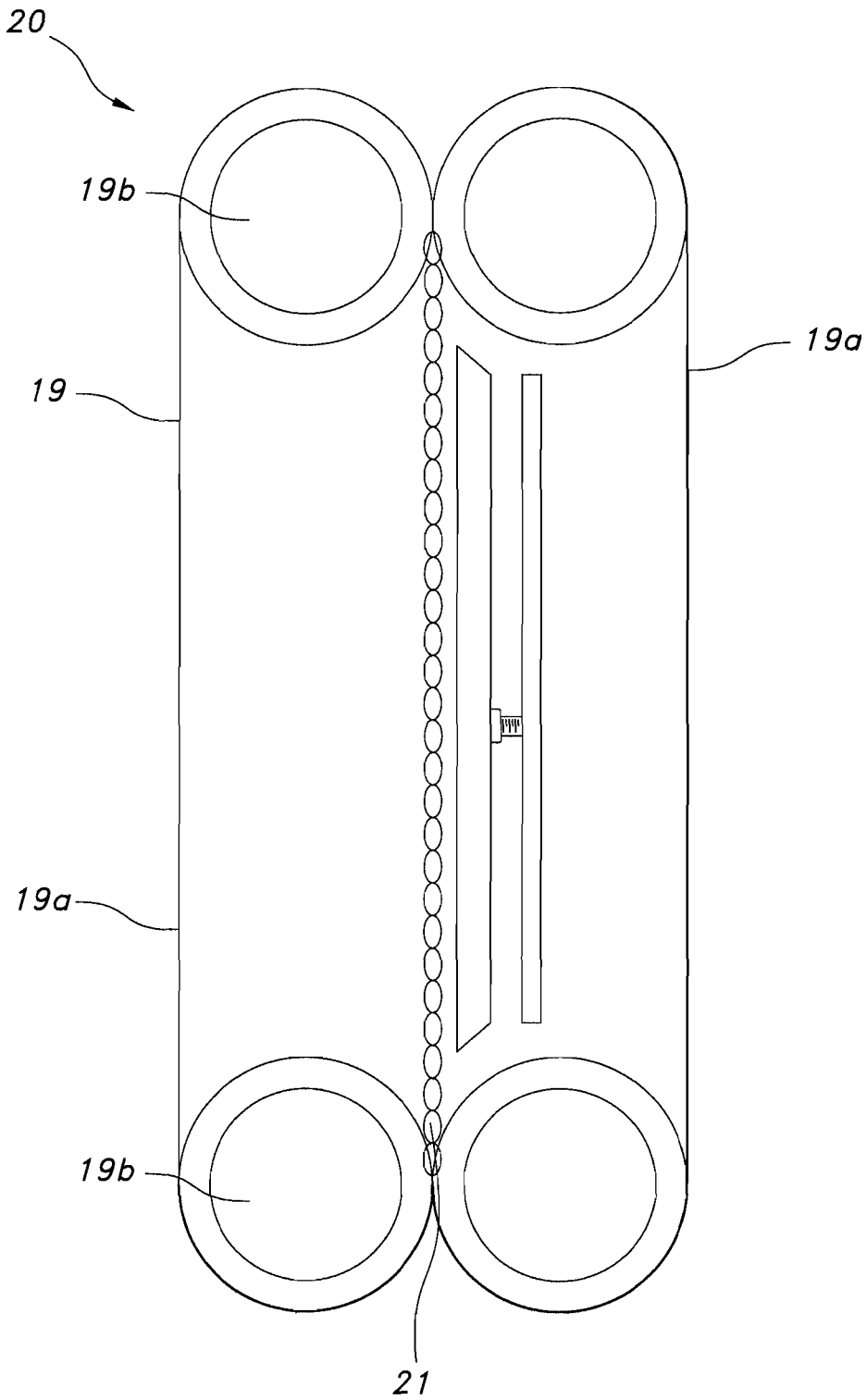

FIG. 3

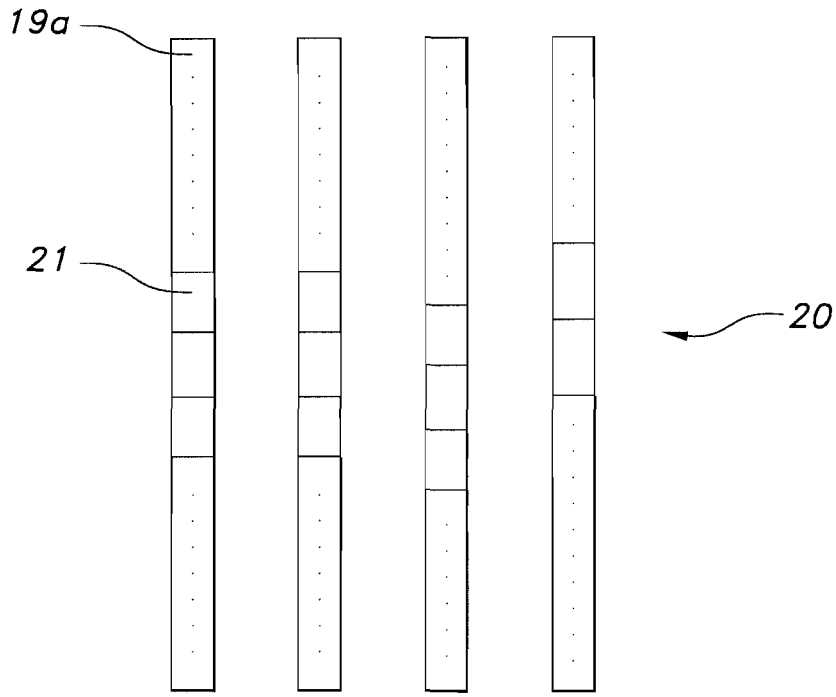

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 08/71226

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A23G 3/00, 3/02, 3/20, 4/00, 4/04, 4/20 (2008.04)
USPC - 426/5, 3; 99/450.6, 450.7
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8)- A23G 3/00, 3/02, 3/20, 4/00, 4/04, 4/20 (2008.04)
USPC- 426/5, 3; 99/450.6, 450.7

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST(PGPB,USPT,USOC,EPAB,JPAB); Google Patents; Google Scholar
center-filled, multiple, ropes, relaxation, swing arm, tubular rope, extruded or extrusion, delay, time delay, conveyor, gum, confectionery

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/0104828 A1 (FORNAGUERA) 10 May 2007 (10.05.2007) para [0005] [0027] [0028] [0030] [0031] [0032] [0033] [0035] [0038].	1-11, 15-24, 28-33
Y		12-14, 25-27
Y	US 6,558,727 B2 (DEGADY et al.) 06 May 2003 (06.05.2003) col 6 ln 25-34; col 6 ln 53-67.	12-14, 25-27
Y	US 4,192,636 A (HAYASHI et al.) 11 March 1980 (11.03.1980) col 1, ln 25-34.	11 and 24

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 October 2008 (08.10.2008)	22 OCT 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774